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राजपत्र, हिमाचल प्रदेश

हिमाचल प्रदेश राज्य शासन द्वारा प्रकाशित

शिमला, बुधवार, 2 फरवरी, 2011 / 13 माघ, 1932

हिमाचल प्रदेश सरकार

[*Authoritative English text of this Department Notification No. FFE-A(B) 2-22/2008-PART dated 29th January,* 2011 *as required under Article* 348(3) *of the Constitution of India*]

FORESTS DEPARTMENT

NOTIFICATION

Shimla-2, *the 29th January*, 20011

No. FFE-A(B) 2-22/2008-PART.—In exercise of the powers conferred by proviso to Article 309 of the Constitution of India, the Governor, Himachal Pradesh, in consultation with the H.P. Public Service Commission, is pleased to make the following rules further to amend the Himachal Pradesh Forest Department, Range Forest Officer, Class-II (Gazetted) Recruitment and Promotion Rules, 2006, as published in Rajpatra (Extraordinary) *vide* notification No. FFE-A(B) 1-3/98 on 10th March, 2006, namely:—

1. Short title and Commencement.—(i) These rules may be called the Himachal Pradesh Forest Department, Range Forest Officer, Class-II (Gazetted) Recruitment and Promotion (Ist Amendment) Rules, 2011.

(ii) These rules shall come into force from the date of publication in the Rajpatra, Himachal Pradesh.

2. Amendment of Annexure-A.—In Annexure-A of the Himachal Pradesh Forest Department, Range Forest Officer, Class-II (Gazetted) Recruitment and Promotion Rules, 2006 :—

(*a*) For the words & figures "21 to 26 years" appearing against column No-6, the words & fugures "21 to 31 years" shall be substituted.;

(*b*) For the existing provisions against Col. No.7, the following shall be substituted, namely:—

"(A) (i) **Essential Qualification:—**Candidates must possess Bachelor's Degree (or equivalent) in Science or Engineering of any recognized University with at least one of the following subjects:—

(i) Agriculture
(ii) Botany
(iii) Chemistry
(iv) Computer Application/ Computer Science,
(v) Agriculture Engineering
(vi) Chemical Engineering
(vii) Civil Engineering
(viii) Computer Engineering
ix) Electrical Engineering
x) Electronics Engineering
xi) Mechanical Engineering
xii) Environmental Sciences
xiii) Forestry
xiv) Geology
xv) Horticulture
xvi) Mathematics
xvii) Physics
xviii) Statistics
xix) Veterinary Science
xx) Zoology:

Provided that the candidates belonging to general cetagories can avail 6 chances to appear in the examination. There shall be no limit for the candidates belonging to SCs/STs/OBCs cetagories:

Provided further that a government servant who is holding substantive/officiating appointment in Himachal Pradesh shall be eligible to appear in the examination if he possess at least Bachelor's degree of any recognized university or equivalent with atleast one of the above mentioned subjects, subject to 6 chances in case of candidate belonging to general category and with no limit for SCs/STs/OBCs candidates. These chances will be inclusive of chances they might have availed as a direct candidate:

Provided further that only those candidates who qualify the written test will be called for the physical test and the number of candidates called for physical test will be five times the number of vacancies;

(ii) (a) Physical Standard:

	Hight (cm)	**Chest girth(cm)**	
		Normal	**Expension**
Male candidate	163	79 cm	05 cm
Female candidate	150	74 cm	05 cm

The following minimum height standard may be allowed in case of candidates belonging to Scheduled Tribes and races such as Assames, Bhuttanese, Garhwalis, Gorkhas, Kumaonis, Ladakhes, Mizo, Naga, Nepalese, Sikkimese and those from Arunachal Pradesh, Lahaul & Spiti and Meghalaya:—

Male candidate 152 cm

Female candidate 145 cm

(b) Male/Female candidates must pass a physical test covering a distance of 25/16 kms within four hours on foot, respectively";

(iii) **Health Certificate**

The candidates selected for training shall have to produce Medical Certificate issued by a duly constituted Medical Board in the form prescribed by Article 19 of the Central Civil Service Regulation of the corresponding rule in the Supplementary rules testifying to the candidates sound hearing and general physical fitness for rough outdoor work in the Forest Department. Candidates will be required to produce medical certificate issued by the medical officer or equivalent authority of the district concerned.

B) Desirable Qualification:—Knowledge of customs manner and dialects of Himachal Pradesh and suitability for appointment in peculiar conditions prevailing in the Pradesh.";

(c) For the existing Provisions against **Column No.-10 (a) and (b)** the following **s**hall be substituted, namely:—

"(a) (i) 55% by Promotion;

(ii) 45% by direct recruitment on a regular basis or by recruitment on contract basis, as the case may be. The contract employees will get emoluments as given in Column 15-A and will be governed by service conditions as specified in the said column.

(b) The candidates selected for training at Forest Research Institute/College, Dehradun or at any other places shall while undergoing the training be treated as "in service" candidates from the date of joining the institute. During the period of training the candidates shall receive pay in the lowest stage of the pay scale of Range Forest Officer applicable to inservice candidates and allowance admissible thereon during the 1st year and at the 2nd stage of the scale during the 2nd year:

Provided that the 2nd increment shall be granted only when a direct recruit has passed the prescribed examination(s) from the concerned Institutes/Colleges";

(d) For the existing provisions against **Column No.l1** the following shall be substituted, namely:—

"(i) 52% by promotion from amongst Dy. Rangers having 8 years regular service or regular combined with continuous adhoc service, if any, rendered in the grade;

(ii) 1½ % by promotion from amongst the Forest Guards who are B.Sc.(Forestry) with 10 years of regular service combined with continuous adhoc service and 1 ½ % from amongst the promoted Dy. Rangers who possesses the degree of B.Sc.(Forestry) combined with continuous adhoc service, if any, rendered in the grade.

The roster for filling up the post by direct recruitment and by promotion from amongst the different feeder categories is annexed as Annexure-"C".

Provided that for the purpose of promotion every employee shall have to serve atleast one term in the Tribal/Difficult areas subject to adequate number of post(s) available in such areas:

Provided further that the proviso (I) supra shall not be applicable in the case of those employees who have five years or less service, left for superannuation: Provided further that Officers/Officials who have not served atleast one tenure in Tribal/Difficult areas shall be transferred to such area strictly in accordance with his/her seniority in the respective cadre.

Explanation-I:—For the provisio (I) supra the "term" in the tribal/difficult areas shall mean normally three years or less period of posting in such areas keeping in view the administrative requirements and performance of the employee. Explanation II:- For the purpose of proviso I supra the Tribal/Difficult Areas shall be as under:-

1. District Lahaul & Spiti.
2. Pangi and Bharmour Sub Division of Chamba District.
3. Dodra Kawar Area of Rohru Sub-Division.
4. Pandrah Vis Pargana, Munish Darkali and Gram Panchyat Kashapat, Gram Panchayats of Rampur Tehsil of District Shimla.
5. Pandrah Bis Pargana of Kullu District.
6. Bara Bhangal Areas of Baijnath Sub Division of Kangra District.
7. District Kinnaur.
8. Kathwar and Korga Patwar Circles of Kamrau Sub Tehsil, Bhaladh Bhalona and Sangna Patwar Circles of Renukaji Tehsil and Kota Pab Patwar Circle of Shillai Tehsil in Sirmour District.

9. Khanyol-Bagra Patwar Circle of Karsog Tehsil Gada Gussaini, Mathyani, Ghanyar, Thachi, Baggi, Somgad and Kholanal of Bali-Chowki, Sub Tehsil Jharwar, KutharhGraman, Devgarh, Trailla, Ropa, Kathog Silh- Badhwani, Hastpur, Ghamrehar and Bhatehar Patwar Circle of Padhar Tehsil, Chiuni, Kalipar, Mangarh, Thach-Bagra, North Magru and South Magru Patwar Circles of Thunag Tehsil and Batwara Patwar Circle of Sunder Nagar Tehsil in Mandi District.

(1) In all cases of promotion, the continuous adhoc services rendered in the feeder post, if any, prior to regular appointment to the post shall be taken into account towards the length of service as prescribed in these rules for promotion subject to the condition that the adhoc

appointment/promotion in the feeder category had been made after following proper acceptable process of selection in accordance with the provisions of R&P rules provided that:

(i) In all cases where a junior person becomes eligible for consideration by virtue of his/her total length of service (including the service rendered on adhoc basis followed by regular service/ appointment) in the feeder post in view of the provision referred to above, all persons senior to him/her in the respective category/ post/cadre shall be deemed to be eligible for consideration and placed above the junior person in the field of consideration:

Provided that all incumbents to be considered for promotion shall possess the minimum qualifying service of at least three years or that prescribed in the R &P Rules for the post which ever is less:

Provided further that where a person becomes ineligible to be considered for promotion on account of the requirements of the preceeding proviso, the person(s) junior to him/her shall also be deemed to be ineligible for consideration for such promotion.

Explanation:—The last proviso shall not render the junior incumbent(s) ineligible for consideration for promotion if the senior ineligible person(s) happened to be Ex-serviceman recruited under the provision of Rule 3 of Demobilised Armed Forces Personnel (Reservation of vacancies in Himachal Pradesh State Non-Technical Services) Rules, 1972 and having been given the benefit of seniority thereunder or recruited under the provisions of Rule-3 of Ex-serviceman (Reservation of vacancies in the Himachal Pradesh Technical Services) Rules, 1985 and having been given the benefit of seniority thereunder.

(2) Similarly in all cases of confirmation continuous adhoc service rendered in the feeder post, if any, prior to the regular appointment/ promotion against such post shall be taken into account towards the length of service, if the adhoc appointment /promotion had been made after proper selection and in accordance with the provision of the R&P Rules:

Provided that inter-se-seniority as a result of confirmation after taking into account, adhoc service rendered as referred to above shall remain unchanged.";

(e) For the existing provisions against **Column No. 15-A,** the following shall be substituted, namely:—

"Notwithstanding anything contained in these rules, contract appointments to the post will be made subject to the terms and conditions given below:-

(I) Concept:—

(a) Under this policy the Range Forest Officer in Department of Forests H. P. will be engaged on contract basis initially for one year, which may be extendable on year to year basis:

Provided that for-further extention/renewal of contract period on year to year basis the concerned HOD shall issue a certificate that the service and conduct of the contract appointee is satisfactory during the year and only then his period of contract is to be renewed/extended.

(b) Post falls within the purview of HPPSC :—The Secretary (Forests) after obtaining the approval of the Govt. to fill up the vacant posts on contract basis will place the requisition with the concerned recruiting agency i.e. H.P. Public Service Commission.

(c) The Selection will be made in accordance with the eligibility conditions prescribed in these Rules.

(II) CONTRACTUAL EMOLUMENTS :—The Range Forest Officer appointed on contract basis will be paid consolidated fixed contractual amount Rs.14100/- P.M. (which shall be equal to minimum of the pay band+ grade pay). An amount of Rs. 423/- (3% of the minimum of the pay band+ grade pay of the post) as annual increase in contractual emoluments for the subsequent year(s) will be allowed if contract is extended beyond one year.

(III) APPOINTING/DISCIPLINARY AUTHORITY:—The Secretary (Forests) H.P. will be appointing and disciplinary authority.

(IV) SELECTION PROCESS:—Selection for appointment to the post in the case of Contract Appointment will be made on the basis of viva –voce test or if considered necessary or expedient by a written test or practical test. The standard/ syllabus etc. of which will be determined by the concerned recruiting agency i.e. H.P.Public Service Commission.

(V) COMMITTEE FOR SELECTION OF CONTRACTUAL APPOINTMENTS:— As may be constituted by the concerned recruiting agency i.e. H.P.Public Service Commission from time to time.

(VI) AGREEMENT:—After selection of a candidate, he/she shall sign an agreement as per ANNEXURE-"B" appended to these Rules.

(VII) TERMS AND CONDITIONS:—(a) The contractual appointee will be paid fixed contractual amount @ Rs. 14100/- P.M. (which shall be equal to minimum of the pay band+ grade pay**).** The contractual appointee will be entitled for increase in contractual amount @ Rs. 423/-(3% of the minimum of the pay band+ grade pay of the post) for further extended years and no other allied benefits such as senior/ selection scales etc. shall be given.

(b) The service of the contract appointee will be purely on temporary basis. The appointment is liable to be terminated in case the performance/ conduct of the contract appointee is not found satisfactory.

(c) Contractual appointment will be entitled for one day casul leave after putting one month service. This leave can be accumulated up to one year. No leave of any other kind is admissible to the contract appointee. He/ she shall not be entitled for medical reimbursement and LTC etc. Only maternity leave will be given as per rules.

(d) Unauthorized absence from the duty without the approval of the Controlling Officer shall automatically lead to the termination of the contract. Contract Appointee shall not be entitled for contractual amount for the period of absence from duty.

(e) An Official appointed on contract basis who have completed five years tenure at one place of posting will be eligible for transfer on need based basis whenever required on administrative grounds.

(f) Selected candidate will have to submit a certificate of his/her fitness from a Government/Registered Medical Practitioner. Women candidate pregnant beyond 12 weeks will stand temporarily unfit till the confinement is over. The women candidate will be re-examined for the fitness from an authorized Medical Officer/ Practitioner.

(g) Contract appointee will be entitled to TA/DA, if required to go on tour in connection with his /her official duties at the same rate as applicable to regular counter part officials at the minimum of pay scale.

(h) Provisions of service rules like FR SR, Leave Rules, GPF Rules, Pension Rules & Conduct Rules etc. as are applicable in case of regular employees will not be applicable in case of contract appointees. They will be entitled for emoluments etc. as detailed in this column."

_____

ANNEXURE-"B"

Form of contract/agreement to be executed between the Range Forest Officer and the Government of Himachal Pradesh through Secretary (Forests) to the Govt. of H.P.

This agreement is made on this _____ day of _____ in the year_____ between Sh./Smt. _____S/o/D/o Shri _____ R/o_____ Contract appointee (hereinafter called the FIRST PARTY),

AND the Governor of Himachal Pradesh through Secretary (Forests) to the Govt. of H.P. (here-in-after the SECOND PARTY).

Whereas, the SECOND PARTY has engaged the aforesaid FIRST PARTY and the FIREST PARTY has agreed to serve as a Range Forest Officer on contract basis on the following terms & conditions:—

1. That the FIRST PARTY shall remain in the service of the SECOND PARTY as a Range Forest Officer for a period of one year commencing on day of _____ and ending on the day of _____. It is specifically mentioned and agreed upon by both the parties that the contract of the FIRST PARTY with SECOND PARTY shall ipso-facto stand terminated on the last working day i.e. on _____ And information notice shall not be necessary:

   Provided that for further extention/renewal of contract period the HOD shall issue a certificate that the service and conduct of the contract appointee was satisfactory during the year and only then the period of contract is to be renewed/ extended.

2. The contractual amount of the FIRST PARTY will be Rs. 14100/- per month.

3. The service of FIRST PARTY will be purely on temporary basis. The appointment is liable to be terminated in case the performance/conduct of the contract appointee is not found good or if a regular incumbent is appointed/ posted against the vacancy for which the FIRST PARTY was engaged on contract.

4. Contractual Range Forest Officer will be entitled for one day casual leave after putting in one month service. This leave can be accumulated upto one year. No leave of any kind is admissible to the contractual Range Forest Officer. He will not be entitled for Medical Reimbursement and LTC etc. Only maternity leave will be given as per Rules.

5. Unauthorized absence from the duty without the approval of the Controlling Officer shall automatically lead to the termination of the contract. A contractual Range Forest Officer will not be entitled for contractual amount for the period of absence from duty.

6. An official appointed on contract basis who have completed five years tenure at one place of posting will be eligible for transfer on need based basis wherever required on administrative grounds.

7. Selected candidate will have to submit a certificate of his/her fitness from a Government/Registered Medical Practitioner. In case of women candidates pregnant beyond twelve weeks will render her temporarily unfit till the confinement is over. The women candidate should be re-examined for fitness from an authorized Medical Officer/Practitioner.

8. Contract appointee shall be entitled to TA/DA if required to go on tour in connection with his/her official duties at the same rate as applicable to regular counter-part official at the minimum of the pay scale.

9. The Employees Group Insurance Scheme as well as EPF/GPF will not be applicable to contractual appointee(s).

IN WITNESS the FIRST PARTY AND SECOND PARTY have herein to set their hands the day, month and year first, above written.

IN THE PRESENCE OF WITNESS:

1. _____
   _____
   _____
   (Name and Full Address)
   (Signature of the FIRST PARTY)

2. _____
   _____
   _____
   (Name and Full Address)

IN THE PRESENCE OF WITNESS:

1. _____
   _____
   _____
   (Name and Full Address)
   (Signature of the SECOND PARTY)

2. _____
   _____
   _____
   (Name and Full Address)";

_____

ANNEXURE-"C"

APPOINTMENT ROSTER FOR THE POST OF RANGE FOREST OFFICER
TOTAL POSTS – 297

Direct = 45% =134		Promotee =55%	= 163
B.Sc(Forestry)=32%	= 94	Dy. Ranger =52%	= 154
B.Sc =13%	= 40	Dy. Rangers & Fgds = 3%(1 ½	= 09

of each) Who possess B.Sc (Forestry) Degree

Deputy Ranger.— 1, 2, 3, 5, 6, 9, 11, 12, 14, 17, 18, 19, 21, 24, 25, 27, 31, 33, 36, 37, 40, 41, 43, 44, 47, 49, 50, 53, 55, 56, 57, 59, 62, 63, 65, 66, 71, 72, 73, 76, 78, 79, 81, 84, 85, 87, 88, 91, 92, 94, 95, 98, 100, 103, 106, 107, 109, 110, 111, 114, 116, 117, 120, 122, 123, 125, 128, 129, 130, 132, 133, 138, 139, 142, 144, 145, 146, 148, 151, 152, 154, 155, 158, 160, 161, 164, 165, 168, 170, 173, 174, 176, 177, 180, 182, 183, 184, 187, 189, 190, 192, 195, 196, 198, 199, 203, 205, 206, 209, 211, 212, 214, 217, 217, 219, 221, 222, 225, 227, 228, 231, 233, 236, 239, 240, 243, 244, 247, 249, 250, 253, 255, 256, 258, 259, 261, 264, 265, 268, 270, 273, 274, 276, 277, 280, 282, 283, 284, 287, 289, 290, 292, 295.

B.Sc.(Forestry).— 1, 7, 10, 13, 16, 20, 23, 26, 29, 32, 35, 39, 42, 46, 18, 51, 54, 58, 61, 64, 69, 70, 74, 77, 80, 83, 86, 90, 93, 96, 101, 102, 105, 108, 113, 115, 118, 121, 124, 127, 131, 136, 137, 140, 143, 147, 150, 153, 157, 159, 162, 166, 169, 172, 175, 179, 181, 185, 188, 191, 194, 200, 202, 204, 207, 210, 213, 216, 220, 224, 226, 229, 232, 235, 238, 241, 242, 246, 248, 251, 254, 257, 260, 263, 266, 269, 272, 275, 279, 281, 285, 288, 291, 294.

Graduates.— 8, 15, 22, 30, 38, 45, 52, 60, 68, 75, 82, 89, 97, 104, 112, 119, 126, 135, 141, 149, 156, 171, 178, 186, 193, 201, 208, 215, 223, 230, 237, 245, 252, 267, 271, 278, 286, 293, 296

Dy. Ranger 67, 134, 197, 262
(B.Sc. Forestry)

Forest Guards 34, 99, 167,234,297
(B.Sc. Forestry)

Once the representation to all categories is achieved by the given point in the roster thereafter the vacancy is to be filled up from the category which vacates the post.

(f) For the existing **Appendix** attached with the existing R&P Rules of RFOs the following shall be substituted, namely:—

"APPENDEX"

RULES RELATING TO THE SUBJECTS AND STANDARDS OF THE COMPETITIVE EXAMINATION FOR THE POST OF RANGE FOREST OFFICER, (CLASS--II, GAZETTED)

1. The candidates who will qualify the Written Examination will be called for physical Standard Test.

2. The written examination shall include two compulsory and two optional papers.

3. A candidate shall specify in his/her application form the optional subjects he/she desire to take, but may intimate any change of intention to the Secretary H.P. Public Service Commission not later than the last date for the receipt of application.

4. A Candidate shall answer the Optional papers in English or Hindi only which is at his/her option choice.

5. No candidate shall be considered to have qualified the written examination unless he/she obtains at least 40% marks in each compulsory papers and 45% marks in aggregate.

6. Provided that in case there is a tie between or amongst the candidates on account of having obtained equal minimum qualifying marks in the written examination all such candidates shall be called for the viva-voce test.

7. The names of the candidates who are called for viva-voce test shall be arranged in order of merit on the basis of the aggregate marks obtained in the written examination.

8. The ranking will be decided on the basis of the marks obtained in all compulsory and optional papers excluding marks of English papers though it would be necessary to obtain 40% marks in each optional paper to qualify.

9. The final ranking shall be determined on the basis of marks obtained by the candidates in the main examination (written as well as interview).

10. In the event of a tie, order of merit shall be determined in accordance with the highest marks secured by a candidate in viva-voce and in case the marks in the viva-voce of the candidates tie, then the order of merit shall be decided in accordance with the highest marks obtained by such candidates in the aggregate of compulsory subjects.

11. If a candidate's hand writing is not legible, a deduction which may be considerable shall be made on this account from the marks otherwise accruing to him/her.

12. Credit will be given for good English/ Hindi including orderly, effective and exact expression combined with the economy of words in all subjects of the examination and not only in subjects which are especially devoted to English/ Hindi.

13. All papers shall be of three hours duration. 14. 5% marks in the written examination shall be awarded to the Forestry Graduates as weightage for having completed 4 years degree course in Forestry.

Syllabus:—The entrance examination shall consist of two compulsory and two optional papers as follows:—

COMPULSORY PAPERS

1. General Knowledge.—General knowledge including knowledge of current event and of such matters of every day observation experience in their scientific aspects as is expected from an educated person who has not made special study of any scientific subject. The paper will also include questions on Indian Polity including the political system and the Constitution of India, History of India and Geography of nature which the candidate should be able to answer without special study. ….. **100 marks**

2. General English (essay and précis writing etc.).—The question paper will be designated to assess the candidate's understanding of his power to write English correctly and idiomatically. It will also include questions to test the candidate's knowledge of grammar, idiom and usage. Passages will be set for summary or précis. Besides there will be an essay on current topics on State, National, International events. The essay will carry 30 marks. Summary on précis 20 marks and other shall be of 50 marks. …**100 marks**

3. Optional Subjects:—Agriculture, Botany, Chemistry, Computer Applications/ Computer Science, Agriculture Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Electronic Engineering, Mechanical Engineering, Environmental Science, Forestry, Geology, Horticulture, Mathematics, Physics, Statistics, Veterinary Science & Zoology.

Candidates are required to offer two of the above subjects. Total number of questions in the question papers of optional papers will be eight. All questions will carry equal marks. Each paper will be divided into two parts viz Part-I and Part-II and each part shall contain four questions. Out of eight questions five questions are to be attempted. One question from each part will be compulsory. The candidates will be required to answer three other questions out of the remaining six questions, taking at least one question from each part. In this way atleast two questions will be attempted from each Part i.e. one compulsory question plus one more. ….**200 marks each subject**

Note-I: The standard of examination in these optional subjects will be that of Bachelor's degree.

Note-II: No candidate shall be allowed to take more than one subject of the group (i) Agriculture, Agriculture Engineering and Veterinary Science (ii) Chemistry and Chemical Engineering (iii) Computer Applications/Computer Science & Computer Engineering.(iv)Electrical Engineering and Electronics Engineering. (v) Mathematics and Statistics.

Note-III: The standard of examination for compulsory paper will be 10+2 intermediate or equivalent level.

4. Interview and Selection:—The Himachal Pradesh Public Service Commission will conduct an interview of those candidates who shall qualify the physical standard test and written examination on marit basis.Total number of candidates who will qualify the physical test will be interviewed by the Commission. The candidates will be interviewed by the Commission who will have before them a record of their career. The object of the interview is to assess the personal suitability of the candidate for the Range Forest Officer (RFO). The test is intended to judge mental calibre of the candidate. In broad terms, this is really an assessment not only of candidate's intellectual qualities but also his social traits and interest in current affairs. Some of the qualities to be adjudged are mental alertness, critical powers of assimilation, care and logical exposition, balance of judgment, Variety & depth of interests, ability for social cohesion & leadership, intellectual and moral integrity. **75 Marks.";**

Written Examination:

1. General Knowledge(emphasis on Environmental, Ecology & Wildlife) 100 marks

2. English (Essay and Precis writing etc.) 100 marks

3. Optional Paper: Candidates are required to offer any two of the following subjects (subject to Note-II above):— 200 marks each

—Agriculture
—Botany
—Chemistry
—Computer Application/Computer Science;
—Agriculture Engineering
—Chemical Engineering
—Civil Engineering
—Computer Engineering
—Electrical Engineering
—Electronics Engineering
—Mechanical Engineering

—Environmental Sciences;
—Forestry
—Geology
—Horticulture
—Mathematics
—Statistics
—Physics
—Veterianry Science and
—Zoology,"

AGRICULTURE

PART-I

Ecology and its relevance to man. Natural resources, their management and conservation. Physical and social environment as factors of crop distribution and production. Climatic elements as factors of crop growth, impact of changing environment on cropping pattern,plants as indicators of environments. Environmental pollution and associated hazards to crops, animals and humans.

Cropping patterns in different agro-climatic zones of the country - impact of high yielding and short duration varieties on shifts in cropping patterns. Concepts and principles of multiple cropping - multistorey, relay and inter-cropping and their importance in relation to food production; Package of practices for production of important cereals, pulses, oilseeds, fibre, sugar and commercial crops grown during Kharif and Rabi seasons in different regions of the country.

Weeds, their characteristics, dissemination and association with various crops; their multiplication; cultural, biological, chemical and integrated control of weeds.

Processes and factors of soil formation, classification of Indian soils including modern concepts, mineral and organic constituents of soil and their role in maintaining soil productivity. Problem soils, extent and distribution in India and their reclamation. Essential plant nutrients and other beneficial elements in soils and plants, their occurrence; factors affecting their distribution, availability functions and recycling in soils; symbiotic and non-symbiotic nitrogen fixation. Principles of soil fertility and its evaluation for judicial fertilizer use.

Watershed management. Soil Conservation planning on watershed basis. Erosion and run of management in hilly, foothills and valley lands - processes and factors affecting them. Dry lands agriculture, its problems and crop production techniques.

Water use efficiency in relation to crop production, criteria for scheduling irrigation, ways and means of reducing runoff losses of irrigation water.

Farm management, scope, importance and characteristics, farm planning and budgeting. Economics of different types of farming systems.

Agriculture extension–its importance and role. Extension techniques, methods of evaluation of extension programs, socio-economic survey and status of big, small and marginal farmers training programs for extension workers. Training and extension programs.

PART-II

Heredity and variation, Mendel's Law of inheritance, Chromosomal theory of inheritance. Cytoplasmic inheritance, Quantitative characters.

Origin and domestication of field crop. Morphology and patterns of variations in varieties and related species of important field crops. Causes and utilization of variations in crop improvement.

Application of the principles of plant breeding to the improvement of major field crops, methods of breeding of self and cross pollinated crops. Introduction, selection, hybridisation, heterosis and its exploitation. Male sterility and self incompatibility, utilization of mutation and polyploidy in breeding.

Seed and seed technology, importance, types and seeds and their production, processing and testing of seeds of crops and seed certification regulation.

Climatic requirements and cultivation of major fruits, plants and vegetable crops with special reference to commercial fruits and vegetables, the package of practices and the scientific basis for same. Handling and Marketing problems of fruits and vegetables, principal methods of preservation of important fruits and vegetable products, processing techniques and equipment. Role of fruits and vegetables in human nutrition, landscape and floriculture, including raising of ornamental plants and design and lay out of lawns and gardens.

Diseases and pests of fields, vegetable, orchard and plantation crops of India and measures to control these. Causes and classification of plant diseases. Principles of plant disease control including exclusion, eradication, immunization and production. Biological control of pests and diseases. Integrated management of pests and diseases. Pesticides and their formulations, plant protection equipment, their care and maintenance.

Growth and Development of Vegetable Crops **-** Physiology of dormancy and germination of vegetable seeds and tubers. Tissue culture techniques.

Post-harvest technology **-** Maturity and ripping process and factors affecting them. Quality evaluation for fresh market and processing. Factors responsible in deterioration of harvested fruits and vegetables, role of growth substances and irradiation in decay control, respiration and transpiration, storage of fresh fruits and vegetables, theories of chilling injury and symptoms of chilly injured. Modified gas storage.

BOTANY

PART-I

(MICROBIOLOGY, PATHOLOGY, PLANT GROUPS AND THEIR MORPHOLOGY, ANATOMY, TAXANOMY, EMBRYOLOGY OF ANGIOSPERMS)

1. Microbiology—(Viruses and Bacteria). Their structure, classification, reproduction and physiology. Mode of infection of Viruses and Bacteria. Role of microbes in industry and agriculture.

2. Pathology - Knowledge of common and important plant diseases caused by fungi and bacteria (Special reference to diseases common in Himachal Pradesh), mode of infection of fungi and control of disease.

3. Plant Groups - Classification, structure, reproduction, life history and economic importance of Algae, Fungi, Bryophytes Pteridophytes and Gymnosperms (including comparative study of various groups). A general knowledge of distribution of important genera of principal sub-division of above groups in India (Emphasis of Western Himalayas).

4. Morphology, Anatomy, Embryology and Taxonomy of Angiosperms Morphology and Anatomy of Stem, Root, Leaf (excluding anomalous growth). Tissue and Tissue system. Structure of Anther and Ovule. Fertilization and development of seed. Classification of Angiosperms, Principles of Nomenclature. Modern trends in Taxonomy. A general knowledge of following families of Angiosperms: Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Rosaceae, Leguminosea, Cucurbitaceae, Umbelliferae, Asteraceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Gramineae.

PART-II

(CELL BIOLOGY, GENETICS AND EVOLUTION, PHYSIOLOGY, ECOLOGY AND ECONOMIC BOTANY)

1. Cell Biology – Cell as a unit of structure and function. Ultrastructure of Cell and its various organelles. Chromosomes – the physical and chemical structure, its behaviour during mitosis and meiosis.

2. Genetics and Evolution – Pre and Post Mandelian concept of Genetics. Development of Gene concept. Genetic code. Nucleic acids, their structure and role in reproduction and protein biosynthesis, Mutations. Role of mutations in plant breeding (wheat, gram, tobacco, cotton only). Organic evolution – evidences and theories.

3. Physiology – Photosynthesis, Absorption and conduction of water, Transpiration, Mineral absorption, Role of elements, Enzymes, Respiration, Fermentation, Growth, Photoperiodism and Vernalisation. Plant Hormones – their type and role. Dormancy of seeds.

4. Plant Ecology – Its scope, plant communities, plant succession, factors. Applied ecology with special reference to pollution and conservation.

5. Economic Botany – Importance of plants, Important plants yielding food, fibre, wood and drugs.

CHEMISTRY

(*Note*:- The student will be expected to solve simple structural, synthetic, mechanistic, conceptual and numerical problems based on and relevant to the syllabus. They are also expected to be acquainted with the S.I. units)

PART-I

***Atomic Structure and Chemical bonding*: –** Quantum theory, Schrodinger equation, particle in a box, hydrogen atom. Hydrogen molecule. Elements of valence bond and molecular orbital theories (idea of bonding, non-bonding and anti-bonding orbitals). Sigma and Pi bonds.

***Chemical Kinetics*: -** Kinetics of reactions involving free radicals, Kinetics of polymerisation and photochemical reactions.

***Surface chemistry and catalysis*:-** Physical absorption, isotherms, surface area determination, heterogenous catalysis, acid bases and enzyme catalysis.

***Electrochemistry*: -** Lomic equilibra; theory of strong electrolytes; Debye, Huckel theory of activity coefficients; electrolytic conduction, galvanic cell, membrane equilibrium and fuel cells. Electrolysis and overvoltage.

***Thermodynamics*: -** Laws of Thermodynamics and application to physiochemical processes systems of variable compositions.

***Electronic structure of transition metal complexes*: -** Crystal field theory and modifications, complexes of Pi-acceptor ligands, organometallic compounds of transition metals.

***Lanthanides Actinides*:-** Separation Chemistry, Oxidation state, magnetic properties. Reaction in nonaqueous solvents.

PART-II

PHYSICAL ORGANIC CHEMISTRY

***Electronic displacements*:-** Inductive, electromeric, mesomeric and hyper-conjugative effects. Electrophiles, nucleophiles and free radicals. Resonance and its application to organic compounds. Effect of structure on the discotiation constants of organic acids and basis. Hydrogen bond and its effects on the properties of organic compounds.

Modern concepts of organic reaction mechanisms, addition, substitution, elimination and rearrangement. Reaction involving free radicals. Mechanisms of aromatic substitution. Benzene intermediates.

***Aliphatic Chemistry*: -** Chemistry of simple oganic compounds belonging to the following classes –alkanes, alkynes, alkyl halides, alcohol, thiols, aldehydes, ketones, acids and their derivatives, ethers, amines, amino acids, hydroxy acids, unsaturated acids, dibasic acids.

Synthetic uses of the following:—Acetoacetic and malonic esters, organometallic compounds of magnesium and lithium, ketene, carbene and diazomethane.

***Carbohydrates*:-** Classification and general reactions of simple monosaccharides, hemistry of glucose, fructose and sucrose.

***Stereo Chemistry*: -** Elements of symmetry and simple symmetry operation, Optical and geometrical isomerism in simple organic molecules, E.Z and R.S notations. Conformations of simple organic molecules. Sterecochemistry of inorganic co-ordination compounds.

***Atomic Chemistry*: -** Benzene, toluene and their helegeno, hydroxy, nitro and amino derivatives, Sulphuric acid, Zylenes, Benzaldehyde, Salicylaldehyde, acetophenone, Benzonic, pathalic, salicylic, cinnamic and mandelic acids. Reduction products of nitrobenzene, Diazonium salts and their synthetic uses. Structure, synthesis and important reactions of naphhtalenes anthracene, Phenantherene, Pyridine and quinoline.

***Basic concepts regarding the following materials of economic and medical importance*:** Cellulose and starch, coal tar, chemicals, organic polymers. Oils and fats, petrochemicals, vitamins, harmones, alkaloids (fermentation products including antibiotics, proteins).

***Organic Photochemistry*:-** Energy level diagrams, quantum yield, Photochemistry of simple organic molecules.

***Polymers*:-** Physical chemistry of Polymers. Molecular weight averages and group analysis, sedimentation light scattering and viscosity of Polymer solutions.

Alloys and inter-metallic compounds.

COMPUTER APPLICATION/COMPUTER SCIENCE

PART-I

Introduction to Computing:

Number Systems, Binary numbers, Boolean logic, History Computer system, basic machine organization, Von Neumann Architecture, Algorithm definition, design, and implementation, Programming paradigms and Languages, Graphical programming, Overview of Software Engineering and Information Technology, Operating system, Compiler, Computer networks and Internet, Computer graphics, Al, Social and legal issues.

Programming Solving Techniques:

Algorithms and problem solving, development of basic Algorithms, analyzing problem, designing solution, testing designed solution, fundamental programming constructs, translation of algorithms to programmes, data types, control structures, functions, arrays, records, files, testing programmes.

Computer Communications & Networks:

Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues, Network System architecture (OSI, TCP/IP), Error control, Flow Control, Data Link Protocols (HDLC,PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switching and IP Networks, Internetworking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues, Programming exercises or projects involving implementation of protocols at different layers.

Digital Logic & Computer Architecture:

Logic design of Digital Systems, Fundamental and advanced concepts of Logic Designs, Boolean Algebra & functions, Designing and implementation of combinational and Sequential logic, minimization techniques, number representation and basic binary arithmetic Logic families and digital integrated circuits, use of CAD tools for logic designs. Topics of Computer Architecture.

Data Structures & Algorithms:

Basic database concepts; Entity Relationship modeling, Relational data model and algebra, Structured Query Language, RDBMS, Database design, functional dependencies and normal forms, Transaction processing and optimization concepts, concurrency control and recovery techniques, Database recovery techniques, Database security and authorization, Small Group Project implementing a database, Physical database design. Storage and file structure, indexed files, hashed files, signature files, b-trees, files with dense index, file with variable length records, database efficiency and tuning.

Operating Systems:

History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreding, Kernel and User Modes, Protection, Problems of cooperative processes,

Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling, dispatch and Introduction to concurrency.

PART-II

Theory of Automata and Formal Languages.

Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automatas (FAs), Transition graphs (TGs),NF As, kleene's theorem, Transducers (automata with output), Pumping lemma and non regular language *Grammars and PDA:* Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs , Normal form grammars and parsing, Push-down Automata, Pumping lemma and non-context free languages, Decidability, Chomsky's hierarchy of grammars, *Turing Machines Theory:* Turing machines, Post machine, Variations on 1M, 1M encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.

Compiler Theory & Design:

Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Comparison between compilers and interpreters.

Numerical Methods

Mathematical Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations, Approximation Theory, Eigenvalues and Eigenvector computation.

Data Base Systems

Basic database concepts, Entity Relationship modelling, Relational data model and algebra, Structured Query language, RDBMS; Database design, functional dependencies and normal forms, Transaction processing and optimization concepts, concurrency control and recovery techniques, Database recovery techniques, Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure, indexed files, hashed files, signature files, b-trees, files with dense index, files with variable length records, database efficiency and tuning Data Warehousing and Data Mining, Emerging Database Technologies and Applications.

Software Engineering

Software Engineering, Process Models, Software verification and validation. Techniques are introduced to evaluate software correctness, efficiency, performance and reliability, integration of these techniques into a verification and validation plan. Technical reviews, software testing, programme verification, prototyping, and requirement tracing. Attitude of industry toward reliability and performance.

Artificial Intelligence

Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, meansends analysis. ElIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Searching, Depth first search, breadth first search, best first search, hill climbing, min-max search. Symbolic Mathematics: student solving algebra problems, translating English

equations, solving algebraic equations, simplification rules, rewrite rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, hornclause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.

Computer Graphics

Graphics hardware, Fundamental algorithms, Applications of graphics. Interactive graphics programming -graph plotting, windows and clipping, and segmentation. Programming raster display systems, panning and zooming. Raster algorithms and software Scan-Converting lines, characters and circles. Region filling and clipping. Two and three dimensional imaging geometry and transformations. Curve and surface design, rendering, shading, colour and animation.

AGRICULTURE ENGINEERING
PART-I

***1. Soil and Water Conservation*:** Scope of soil and water conservation. Mechanics and types of erosion, their causes. Rainfall, runoff and sedimentation relationships and their measurement. Soil erosion control measures - biological and engineering including stream bank protection-vegetative barriers, contour bunds, contour trenches, contour stone walls, contour ditches, terraces, outlets and grassed waterways. Gully control structures- temporary and permanent; design of permanent soil conservation structures such as chute, drop and ponds. Principles of flood control - flood routing. Watershed Management - investigation, planning and implementation; selection of priority areas and watershed work plan, water harvesting and moisture conservation. Land development - levelling, estimation of earth volumes and costing. Wind erosion process-design of shelter belts and wind brakes and their management. Forest (Conservation) Act.

Aerial Photography and Remote Sensing: Basic characteristics of photographic images, interpretation keys, equipment for interpretation, imagery interpretation for land use, geology, soil and forestry. Remote sensing – merits and demerits of conventional and remote sensing approaches. Types of satellite images, fundamentals of satellite image interpretation, techniques of visual and digital interpretations for soil, water and land use management. Use of GIS in planning and development of watersheds, forests including forest cover, water resources etc.

2. *Irrigation and Drainage*: Sources of water for irrigation. Planning and design of minor irrigation projects. Techniques of measuring soil moisture - laboratory and *in situ*. Soil water plant relationships. Water requirement of crops; planning conjunctive use of surface and ground water. Measurement of irrigation water, measuring devices - orifices, weirs and flumes. Methods of irrigation - surface, sprinkler and drip, fustigation. Irrigation efficiencies and their estimation. Design and construction of canals, field channels, underground pipelines head gates, diversion boxes and structures for road crossing. Occurrence of ground water, hydraulics of wells, types of wells (tube wells and open wells) and their construction. Well development and testing. Pumps - types, selection and installation. Rehabilitation of sick and failed wells. Drainage - causes of water loggingand salt problem. Methods of drainage - drainage of irrigated and un-irrigated lands, design of surface, sub-surface and vertical drainage systems. Improvement and utilization of poor quality water. Reclamation of saline and alkali soils. Economics of irrigation and drainage systems. Use of wastewater for irrigation – standards of wastewater for sustained irrigation, feasibility and economics.

3. *Agricultural structure*: Site selection, design and construction of farmstead – farm house, cattle shed, dairy bam, poultry shed, hog housing, machinery and implement shed, storage

structures for food grains, feed and forage; Design and construction of fences and farm roads. Structures for plant environment - green houses, polyhouses and shade houses. Common building materials used in construction - timber, brick, stone, tiles, concrete etc. and their properties, water supply, drainage and sanitation system.

PART- II

4. ***Farm Power and Machinery*****:** Agricultural mechanisation and its scope. Sources of farm power-animate and electro-mechanical. Thermodynamics, construction and working of internal combustion engines. Fuel, ignition, lubrication, cooling and governing system of IC engines. Different types of tractors and power tillers. Power transmission, ground drive, power take off p.t.o. and control systems. Operation and maintenance of farm machinery for primary and secondary tillage. Traction theory. Sowing, transplanting and interculture implements and tools. Plant protection equipment - spraying and dusting. Harvesting, threshing and combining equipment. Machinery for earth moving and land development - methods and cost estimation. Ergonomics and man-machine system. Machinery for horticulture and agro-forestry, feeds and forages. Haulage of agricultural and forest produce.

5. ***Agro-energy*****:** Energy requirements of agricultural operations and agro-processing. Selection, installation, safety and maintenance of electric motors for agricultural applications. Solan (thermal and photovoltaic), wind and bio-gas energy and their utilisation in agriculture. Gassification of biomass for running IC engines and for electric power generation. Energy efficient cooking stoves and alternate cooking
fuels. Distribution of electricity for agricultural and agro-industrial applications.

6. ***Agricultural Process Engineering*****:** Post harvest technology of crops and its scope. Engineering properties of agricultural produces and by-products. Unit operation -cleaning grading, size reduction, densification, concentration drying/ dehydration, evaporation, filtration, freezing andpackaging of agricultural produces and by-products. Material handling equipment-belt and screw conveyors, bucket elevators, their capacity and power requirement. Processing of Milk and dairy products - homogenisation, cream separation, pasteurisation, sterilization, spray and roller drying, butter making, ice cream, cheese and shrikhand manufacture. Waste and by-product utilization-rice husk, rice bran, sugar can bagasse, plant residues and coir pith.

7. ***Instrumentation and computer applications in agricultural engineering*****:** Electronic devices and their characteristics - rectifiers, amplifiers, oscillators, multi-vibrators, Digital circuits, sequential and combinational system. Application of microprocessors in data acquisition and control of agricultural engineering process-measurement system for level, flow strain, force, torque, power pressure, vacuum and temperature. Computers - introduction, input/ output devices, central processing unit, memory devices, operating systems, processors, keyboards and printers. Algorithms, flowchart specification, programme translation and problem analysis in Agricultural Engineering Multimedia and audio-visual aids.

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CHEMICAL ENGINEERING

PART-I

(a) Fluid and Partical Dynamics**:** Viscosity of fluids. Laminar and turbulent flows. Equation of continuity and Navier-Stokes equation; Bernoulli's theorem. Flow meters. Fluid drag and pressure drop due to friction, Reynold's Number and friction factor – effect of pipe roughness.

Economic pipe diameter. Pumps, water air/steam jet ejectors, compressors, blowers and fans. Agitation and mixing of liquids. Mixing of solid and pastes. Crushing and grinding - principles and equipment. Rittinger' and Bond's laws; Filtration and filtration equipment. Fluid - partical mechanics - free and hindered settling. Fluidization and minimum fluidization velocity, concept of compressible and incompressible flow. Transport of solids.

***(b) Mass Transfer*:** Molecular diffusion coefficients, first and second law and diffusion, mass transfer coefficients, film and penetration theories of mass transfer. Distillation, simple distillation, relative volatility, fractional distillation, plate and packed columns for distillation. Calculation of theoretical numbers of plates. Liquid-liquid equilibria. Extraction theory and practice; Design of gas absorption columns. Drying, humidification, de-humidification. Crystalisation. Design of equipment.

(c) Heat Transfer: Conduction, thermal conductivity, extended surface heat transfer. Convection – free and forced. Heat transfer coefficient – Nusselt number. LMTD and effectiveness. NTU methods for the design of Double Pipe and Shell & Tube Heater Exchangers. Analogy between heat and momentum transfer. Boiling and condensation heat transfer, single and multiple effect evaporators. Radiation: Stefan-BoltzmanLaw, emissivity and absorptivity. Calcuation of heat load of a furnance. Solar heaters.

***(d) Noval Separation Processes*:** Equilibrium separation processes: ion-exchange, osmosis, electrodialysis, reverse osmosis, ultra-filtration and other membrane processes. Molecular distillation, super critical fluid extraction.

***(e) Process Equipment Design*:** Factors affecting vessel design criteria-Cost consideration. Design of storage vessels - vertical, horizontal spherical, underground tanks for atmospheric and higher pressure. Design of closures flat and elliptical head. Design of support. Materials of construction – characteristics and selection.

***(f) Process Dynamic and control*:** Measuring instruments for process variables like level, pressure flow, temperature PH and concentration with indication in visual/ pneumatic/ analog/ digital signal forms. Control variable, manipulative variable & load variables. Linear control theory- Laplace, transforms, PID controllers, Block diagram representation transient and frequency response, stability of closed loop system. Advanced control strategies. Computer bases process control.

PART-II

***(a) Material and Energy Balance*:** Material and energy balance calculations in process with recycle/ bypass/purge. Combustion of solid/ liquid/ gaseous fuels, stoichiometric relationships and excess air requirements. Adaiabatic flame temperature.

(b) ***Chemical Engineering thermodynamics*:** Laws of thermodynamics. PVT relationships for pure components and mixtures. Energy functions and inter-relationships Maxwell's relations. Fugacity, activity and chemical potential. Vapour-liquid equilibria, for ideal/ non-ideal, single and multicomponent systems. Criteria for chemical reaction equilibrium, equilibrium constant and equilibrium conversions. Thermodynamic cycles – refrigeration and power.

(c) ***Chemical Reaction Engineering*:** Batch reactors - kinetics and homogeneous reactions and interpretation of kinetic data. Ideal flow reactors - CSTR, plug flow reactors and their performance equations. Temperature effects & run-away reactions. Heterogeneous reactions

catalytic and non-catalytic & gas-solid & gas –liquid reactions. Intrinics kinetics and global rate concept. Importance of interphase & interparticle mass transfer on performance. Effectiveness factor. Isothermal and non-isothermal reactors and reactor stability.

(d) ***Chemical Technology*:** Natural organic products -Wood and wood-based chemicals, pulp and paper, Agro-industries-sugar, Edible oils extraction (including tree based seeds), Soaps and detergents. Essential oils- Biomass gassification (including biogas). Coal and coal chemical. Petroleum and Natural gas - petroleum refining (Atmospheric distillation/ cracking/ reforming) Petrochemical industries – Polythylenes (LDPE/HOPE/ LLDPE), Polyvinyl Chloride, Polystyrene. Ammonia manufacture. Cement and lime industries. Paints and varnishes. Glass and ceramics. Fermentation - alcohol and antiboitics.

(e) ***Environmental Engineering and Safety*:** Ecology and Environment. Sources of pollutants in air and water. Green house effect, ozone layer depletion, acid rain. Micrometeorology and dispersion of pollutants in environment.Measurement techniques of pollutant levels and their control strategies. Solid waste, their hazards and their disposal techniques. Design and performance analysis of pollution control equipment. Fire and explosion hazards rating-HAZOP and HAZAN. Emergency planning, disaster, management. Environmental legislation's-water air environment protection Acts. Forest (Conservation) Act.

***(f) Process Engineering Economics*:** Fixed and working capital requirement for a process industry and estimation methods. Cost estimation and comparison of alternatives. Net present value by discounted cash flow. Pay back analysis. IRR, depreciation, taxes and insurance. Break-even point analysis. Project scheduling -PERT and CPM - Profit and loss account, balance sheet and financial statement. Plant location and plant layout including piping.

CIVIL ENGINEERING

PART-I

(A) THEORY AND DESIGN OF STRUCTURES:

(a) ***Theory*:**

Principle of superposition, reciprocal theorem, unsymmetrical bending.

Determinate and indeterminate structures, simple and space frames, degrees of freedom, virtual work, energy theorems, deflection of trusses, redundant frames, three moment equation, scope deflection and moment distribution methods. Column analogy, energy methods, approximate and numerical methods.

Moving loads - Shearing force and bending moment diagrams, influence lines for simple and continuous beams and frames.

Analysis of determinate and indeterminate arches, spandrel braced arch.

Matrix methods of analysis, stiffness and flexibility matrix. Elements of plastic analysis.

(b) Steel Design:

Factors of safety and load factor, design of tension, compression and flexural members built upbeams and plate girders, semi-rigid and rigid connections. Design of stancheons, slab and

gussetted bases, crane and gantry girders, roof trusses, industrial and multi-storeyed building, water tanks.

Plastic design of continuous frames and portals.

(c) R.C Design:

Design of slabs, simple and continuous beams, columns, footings single and combined reft foundations, elevated water tanks, encased beams and columns, ultimate load design. Methods and system of prestressing, anchorages, losses in prestress design of prestressed girders, ultimate load design.

(B) FLUID MECHANICS AND HYDRAULIC ENGINEERING:

Dynamics of fluid equations of continuity, energy and momentum. Barnoullis theorem, cavitation, Velocity potential and stream function, rotational and irrotationan flow, free and forced vortices, flownet. Dimensional analysis and its application to practical problems.

Viscous flow:- Flow between static and moving parallel plates, flow through circular tubes, film lubrication, velocity distribution in laminar and turbulent flow, boundary layer.

Incompressible flow through pipes:- Laminar and turbulent flow, critical velocity, losses, stamaton diagram. Hydraulic and energy grade lines, siphons pipe not work forces on pipe bends.

Compressible flow:- Adiabatic and isentropic flow subsonic and supersonic velocity, Machnumber, shock waves, water hammer.

Open channel flow:- Uniform and non-uniform flow, best hydraulic cross-section. Specific energy and critical depth gradually varied flow classification of surface profiles, control sections, standing wave flume, surges and wave and waves, hydraulic jump.

Design of canals:- Unlined channel in alluvium, the critical tractive stress, principles of sediment transport regime theories, lined channels, hydraulic design and cost analysis, drainage behind lining.

Canal structures:- Designs of regulation work, cross drainage and communication work cross regulators, head regulator, canal falls, aqueducts, metering flumes etc., canal outlets.

Diversion Head works:- Principles of design of different parts on impermeable and permeable foundations, Khosla's theory, energy dissipation, sediment analysis.

Dams:- Design of rigid dams, earth dams, forces acting on dams, stability analysis. Design of Spillways, Wells and Tube Wells.

(C) SOIL MECHANICS AND FOUNDATION ENGINEERING:

Soil Mechanics:- Original classification of soil, atterburglimits, void ratio, moisture contents, permeability, laboratory and field tests. Seepage and flow nets, flow under hydraulic structures, uplift and quick sand condition; Unconfined and direct shear tests, triaxial test, earth pressure theories, stability of slopes, theories of soil consolidation, rate of settlement. Total and effective stress analysis, pressure distribution in soils, Boussinasque and Wasterguard theories. Soil stabilization.

Foundation Engineering. Bearing capacity of footings piles and wells; design of retaining walls, sheet piles and caissons.

PART-II

(D) BUILDING CONSTRUCTIONS:

Building materials and constructions:- Timber, stones, brick, sand, surkhi, mortar, concrete, paints and varnishes, plastic, etc.

Detailing of walls, roofs, floors, ceilings, staircases, doors and windows. Finishing of buildings -plastering, pointing, painting etc. Use of building codes, ventilation, air conditioning, lighting and acoustics. Building estimates and specifications, construction scheduling, PERT and CPM methods.

(E) RAILWAYS AND HIGHWAYS ENGINEERING:

(a) ***Railways***:- Permanent way, ballast, sleeper, chairs and fastenings, points and crossing, differenttypes of turn outs, cross-overs, setting out of points. Maintenance of track, super elevation, creep of rain, ruling gradients, track resistance, tractive effort,curve resistance. Station yards and machinery, station buildings, platform sidings, turn tables. Signal and inter locking, level crossings.

(b) ***Roads and Runways***:- Classification of roads, planning, geometric design of flexible and rigid pavements, sub-bases and wearing surfaces. Traffic engineering and traffic surveys, intersections road signs, signals and markings.

(F) WATER RESOURCES ENGINEERING:

Water requirements for crops: - Quality of irrigation water, consumptive use of water, water depth and frequency of irrigation, duty of water, irrigation methods and efficiencies.

Distribution system for canal irrigation: -Determination of required channal capacity, channel losses, alignment of main and distributory channels. *Water logging:*- Its causes and control, design of drainage system, soil salinity. *River training*:- Principles and methods.

Storage works: - Types of dams (including earth dams) and their characteristics, principles of design, criteria for stability. Foundation treatment, joints and galleries. Control of seepage.

Spillways:- Different type and their suitability, energy dissipation, spillway crest gates.

(G) SANITATION AND WATER SUPPLY:

Sanitation:- Site and orientation of buildings, ventilation and damp proof course, house drainage, conservancy and water borne system of waste disposal. Sanitary appliances – latrines and urinals. Disposal of sanitary sewage, industrial waste, storm sewage - separate and combined system, flow through sewers, design of sewers, sewer appurtenances, manholes, inlets, junctions, siphon, ejection etc. Sewer treatment working principles, units, chambers, sedimentation tank etc. Activated sludge prepuces, septic tank, disposal of sludge. Rural sanitation, environment pollution and ecology.

Water supply:- Estimation of water resources, ground water hydraulics, predicting demand of water. Impurities of water - physical, chemical and bacteriological analysis. Water borne diseases.

Intake of water:- Pumping and gravity schemes. Water treatment. Principles of settling, coagulation, flocculation and sedimentation. Slow, rapid and preassure filters, softening, removal of taste, odour and salinity.

Water distribution:- Layout storage, hydraulic pipelines, pipe fittings, pumping stations and their operations.

COMPUTER ENGINEERING

PART-I

Digital Electronics

Introduction to number System and their conversions. Arithmatic with bases other than ten. Boolean Algebra and Simplification of Boolean expressions. Standard form of boolean functions, Minterm Maxterm designation of functions, Combinational Circuits. Introduction to switching devices, positive and negative logic of OR, AND, NOR, NAND, Exclusive OR, and Exclusive NOR gates, IC digital logic families. implification of function by karrnaugh maps. Quine McCluskey tabular methods for simplification of Boolean function and determination of prime implicants. Selection of an optimal set of prime implicants, multiple output circuits and map minimization of multiple output circuits;. General characteristics of sequential circuits. Clock, puls and level mode sequential circuits. Analysis and design of a sequential circuit.

Programming Languages

Structured programming and object oriented programming. Abstraction, encapsulation, data hiding, Polymorphism, Scope rules, Parameter passing, run time environment, Static and dynamic storage management, garbage collection, exception handling, task and concurrency in programming language like C, C++. JAVA. Concepts of 4GL

Data Structure And Algorithms

Elementary and structured data types, Linear Structures: Arrays and Records, Stacks, Queues and Linked Lists, Strings Prefix, Postifix, infix expressions. Non linear structures: generalized linked list, trees, graphs and their traversals, trie and dictionary. Built in Data structures such as Records, Files Sets, Graphs and Pointers. Recurssion, Sorting-Internal and External, Searching, Hashing, Symbol Tables. Problem solving and algorithms development and analysis.

Computer Architecture

Processor Organization, Instruction fetch and executic cycles, information representation, Number formats and their representation in memory. Common addressing techniques, instruction types, Arithmetic operatiojnns and their implementations. Memories : types, characteristics and organization. System modeling, Design levels. Register level design, Description language, Processor level design, Design Techniques. Instruction Sequencing and interpretation hardwired controls and its implementation concepts, microprogrammed control Conversional and unconversional microprogrammed control computers.

Data Base Management System

Need, Purpose and Goals of DBMS. Physical and Logical data bases, data abstraction and data independence, data aggregation, data mdels: ER and object Oriented Models, Introduction to relational model, relation algebra, theory of normalization. SQL. Physical data organization in sequential, Indexed, Random and Hashed files. Inverted and multilist structures, B+ Trees. Transaction processing, concurrency control, recovery management and database security, Transaction model properties and state serializability, Lock based protocols. Deadlock prevention and detection. Introduction to Distributed DBMS.

PART-II

System Programming and Operating System

Concept of machines and assembly language programming, representation of instruction and data, assemblers, and macro assemblers. Introduction to Operating System, Operating System Services and Kernael. Multiprogramming & Time Sharing, Memory management, Paging and Segmenting, Input Output and Device Management, Disk and File management. Deadlocks and concurrent processes. Protection and security, Introduction to multiprocessors and distributed operating systems. Case studies of UNIX and WINDOWS operating systems.

Theory of Computation and Compile Design

Introduction to Automata Theory, Language, regular expression, finite automata, transition graph, nondeterminism, Push Down Automata Theory, context free grammars, trees, regular grammars, context-free languages. Introduction to compliers, translators and interpreters, compilation process. Lexical and Syntactical analysis. Top Down and Bottom up parsing, syntax directed translation. Symbol tables organizations : Hashing, Linked List, Tree structures. Code generation : Compilation of expressions and control structures. Error detection and recovery. Code optimization : Optimizing transformation, local and global optimization.

Computer Networks

Data communication Fundamentals, Computer Network, Architecture, Packet and circuit switching. Functions and working of OSI layers. Satellite and packet radio network. Local area network. Internetworking and ISDN/B-ISDN. Network Protocols: Ethernet, TCP/IP. Network management and Interoperability. Performance issues of LAN and WAN.

Software Engineering

Introduction to Software Engineering, Requirement Engineering, Structural System Design, Data Oriented analysis and Design, Object Oriented Analysis and Design, Software Quality Assurance. User interface design, Software complexity and reliability. Software project management.

Computer Graphics

Introduction to interactive computer graphics, picture analysis overview of programmer's model of interactive graphics. Fundamental problems in geometry. Basic Raster Graphics: Scan Conversion, filling and clipping. Geometric manipulations : Transformation, Matrices and homogeneous coordinates. Elementary 3-D graphics, plane projections, vanishing points, specification of 3-D view. Visibility, image and object precision, z-buffer algorithms, area based algorithms, floating horizon. Curves and surfaces: parametric representation, Bezer and B-spline curves. Rendering: Ray tracing, antialiasing, Gourard and Phong Shading.

Electrical Engineering

PART-I

1. EM Theory

Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Maxwell's equations. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. ELECTRICAL MATERIALS

Band Theory, Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. ELECTRICAL CIRCUITS

Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase

4. MEASUREMENTS AND INSTRUMENTATION

Units and Standards. Error analysis, measurement of current, Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS

Mathematical modeling of physical systems. Block diagrams and signal flow graphs and their reduction. Time domain and frequency domain analysis of linear dynamical system. Errors for different type of inputs and stability criteria for feedback systems. Stability analysis using Routh-Hurwitz array, Nyquist plot and Bode plot. Root locus and Nicols chart and the estimation of gain and phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

6. ELECTRCIAL MACHINES AND POWER TRANSFORMERS

Magnetic Circuits - Analysis and Design of Power transformers. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation. Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency. B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Characteristics and performance analysis. Generators and motors. Starting and speed control. Testing, Losses and efficiency. Synchronous Machines. Construction. Circuit model. Operating characteristics and performance analysis. Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation. Hunting. Short circuit transients. Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

PART-II

1. POWER SYSTEMS

Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power system operation. Load frequency control. Symmetrical short circuit analysis. ZBus formulation. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

2. ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS

Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, ultistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators and flip-flops and their applications. Digital logic gate families, universal gates-combination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

3. MICROPROCESSORS

Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Micro-processors in power system.

4. COMMUNICATION SYSTEMS

Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

5. POWER ELECTRONICS

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1- phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

Electronics Engineering
PART-I

BASIC ELECTRONICS-MATERIALS AND DEVICES

Materials and Components :

Structure and properties of Electrical Engineering materials, Conductors, Semiconductors and Insulators, magnetic, Ferroelectric, Piezoelectric, Ceramic, Optical and Super-conducting materials. Passive components and characteristics Resistors, Capacitors and Inductors, Ferrites, Quartz crystal, Ceramic resonators, Electromagnetic and Electromechanical components.

Physical Electronics, Electron Devices and ICs :

Electrons and holes in semiconductors, Carrier Statistics, Mechanism of current flow in a semiconductor, Hall effect; Junction theory; Different types of diodes and their characteristics; Bipolar Junction transistor; Field effect transistors; Basics of ICs - bipolar, MOS and CMOS types, basic of Opto-electronics. IC Technologies : Fabrication techniques Basic CMOS VLSI, Full custom VLSI design, Inverter analysis, layout rules, layout of basic gates, circuit extraction, Layout of basic data path.

ELECTRONICS CIRCUITS AND APPLICATIONS

Analog Electronic Circuits :

Transistor biasing, bias stabilization and Small signal and frequency response analysis of transistor circuits. Power amplifiers. Feedback amplifiers, Tuned amplifiers, Wide-banding

techniques. Transistor oscillators. Diode rectifiers, regulators and power supplies. Operational Amplifiers, Phase Locked Loops and other linear integrated circuits with applications. Pulse shaping circuits and waveform generators.

Industrial Electronics :

Thyristor family, principle of operation, commutation circuits Controlled rectifiers, single phase and three phase with different loads. DC choppers : step-up and step-down choppers, chopper circuits, switched mode regulators, effect of source and load inductance. Cyclo-converters: Single and three phase cyclo-converters. Inverter circuits: Single phase bridge inverters, three phase inverters, voltage control of three phase inverter, harmonic reduction. Industrial applications: Induction and dielectric heating, Basic concepts of speed control of DC/AC drives.

SIGNALS AND SYSTEM

Signals and Systems :

Classification of signals and systems: System modeling in terms of differential and difference equations; Electronics Engineering MPSC, Maharashtra Public Service Commission Electronics Engineering Exam http://www maharashtraeducation.net/Civil_Services/mains/ Electronics.asp [16- 11-2009 16:11:36]. State variable representation and solution of state of variable equations for continuous and discrete time systems. Fourier series, Fourier transforms, properties and their applications to system analysis.

Laplace transform : properties and its application to system analysis. Convolution integral, superposition integral and their applications.

Z-transform : properties and its applications to the analysis and characterisation of discrete time systems. Discrete time signals and systems, System Classification, stability, DTFT, DFT, FFT algorithms: Decimation in time and frequency. Linear and circular convolution. Designing of Digital filters - FIR and IIR filters, Butterworth and Chebycheff filters.

Network theory :

Network analysis techniques; Network theorems, transient and sinusoidal steady state response. Network graphs and their applications in network analysis; Tellegen's theorem. Two port networks; Z, Y, h and transmission parameters. Analysis of two port networks, Network functions, parts of network functions, obtaining a network function from a given part.

Transmission criteria: delay and rise time, Elmore's and other definitions, effect of cascading. Elements of one-port and two-port network synthesis.

INSTRUMENTATION AND CONTROL

Electronic Measurements and instrumentation :

Basic concepts, standards and error analysis; Measurements of basic electrical quantities and parameters. Analog and digital electronic measuring instruments, their principles of working their comparison, characteristics and applications.

Transducers: Electronic measurements of non-electrical quantities like temperature, pressure, humidity. Basics of telemetry for industrial use.

Control Systems :

Transient and steady state analysis of systems. Block diagram reduction and signal flow graphs, Mason's gain formula. Effect of feedback on the performance of systems. Absolute and relative stability of systems.

Frequency response analysis :

Bode diagram, Root Locus, Principle of argument and Nyquist criteria. Constant-M and Constant-N Loci. Nichol's Chart. Stability analysis of continuous time systems with respect to the state space model and Jury's stability criterion for the stability of discrete time systems.

PART-II

DIGITAL ELECTRONICS AND MICROPROCESSORS :

Transistor as a switching element. Boolean algebra, Number theory. Simplification of Boolean functions, Karnaugh maps and applications. IC Logic gates and their characteristics.

IC logic families: DTL, TTL, ECL, NMOS, PMOS and CMOS gates and their comparison.

Combinational logic Circuits: Half adder, Full adder; Digital comparator; Multiplexer, Demultiplexer ; ROM and their applications and Design. Flip flops. R-S, J-K,D and T flip-flops; Different types of counters and registers, Design using flip flops. Waveform generators. A/D and D/A converters. Semi conductor memories. Digital design-POS,SOP minimization, PAL and PLAs, PLDs, FPGA

Sequential machine design : Mealy and Moore machines, Asynchronous machines-Analysis and design: Races and Hazards. Microprocessors: Architecture and instruction set of Microprocessors 8085 and 8086, Assembly language Programming.

Microprocessor based system design: typical examples, PLCs. Personal computers and their typical uses.

COMMUNICATION SYSTEMS :

Random signals and probability, Correlation functions; Spectral density; Response of linear system to random inputs. Basic information theory. Sampling, quantisation and introduction to coding techniques.

Analog Modulation and demodulation techniques: AM, FM and PM, Radio broadcast transmitters and receivers.

Digital modulation and demodulation techniques, data recovery: integrator, matched filters, correlation receivers and their error probability analysis. Time division and frequency division multiplexing. Equalization.

Telephone networks: Modern telephone exchanges, switching techniques. Elements of Mobile communication. Satellite Communication, Multiple access techniques –FDMA, CDMA.

ELECTROMAGNETICS AND MICROWAVE ENGINEERING

Electromagnetic Theory :

Analysis of electrostatic and magnetostatic fields; Laplace's and Poisson's equations. Boundary value problems and their solutions; Maxwell's equations. Wave propagation through bounded and unbounded media.

Transmission lines:

basic theory, standing waves, stub matching techniques. Microstrip lines. Propagation of signals at HF, VHF, UHF and microwave frequency. Elements of antenna theory.

Microwave Engineering :

Analysis of Microwave Tubes. Solid state microwave devices and their applications. Analysis of waveguides (rectangular and cylindrical). Microwave Components and Circuits. Micro strip circuits. Microwave Measurements. Microwave Antennas.

Optical Communication:

Basics of optical fibre: Numerical aperture, cone of acceptance, rectilinear and curvilinear propagation of light waves through fibre single mode and multi- mode propagation, Optical fibre as a cylindrical wave guide, dispersion and attenuation, splicing techniques, fibre losses, link length calculations, Optical sources and amplifiers, optical detectors, dispersion management in optical fibres. Microwave Communication Systems (terrestrial and Satellite based).

Data structures and computer algorithms :

Electronics Engineering MPSC, Maharashtra Public Service Commission Electronics Engineering Exam Data representation, Programming, Elements of a high level programming language C. Use of data structures such as stacks, queues, linked lists, trees and graphs. Algorithms for insertion and deletion of elements in these data structures. Complexity of algorithms, sorting and searching techniques, Spanning trees, shortest path, Knapsack problem, Traveling sales person's problem, NP-Hard, NP-Complete. Design techniques(Greedy/Dynamic programming/ Divide and conquer).

Computer Organisation :

Fundamentals of computer architecture. Processor design; Control unit design. Memory organisation, I/O System Organisation. Advanced architectures- Parallel processing.

Computer Networks :

ISO/OSI model, packet switching, congestion in communication networks Sliding window protocol. LAN technologies (Ethernet/UDP), TCP, Internet Protocol. Basic concepts of switches, gateways and routers, Internet technologies. Network security.

MECHANICAL ENGINEERING
PART-I

***Statics*:**- Equilibrium in three dimensions. Suspension cables. Principle of virtual work.

***Dynamics*:**- Relative motion, coriolis force, Motion of a rigidbody Gyroscopic motion. Impulse.

Theory of Machines:- Higher and lower pairs, inversions, steering mechanism, Hooks joint, velocity and acceleration of lines, inertia forces. Cams. Conjugate action in gearing and interference, gear trains, epicyclic gear. Clutches, belt drives, brakes, dynamometers, fly wheels, governors, balancing of rotating and reciprocating masses and multicylinder engines. Free, force and damped vibration for a single degree of freedom. Degrees of freedom. Critical speed and whirling of shafts.

Mechanics of Solids:- Strees and strain in two dimensions. Mohr's Circle. Theories of failure, deflection of beams, buckling of columns; combined bending and torsion. Castiglianos theorem. Thick cylinders, rotating disk. Shrink fit. Thermal stress.

Manufacturing Science:- Merchant's theory, Taylor's equation, Machineability. Unconventional machining methods including EDM, ECM and ultrasonic machining. Use of lasers and plasmas.

Analysis of forming processes. High velocity forming. Explosive forming. Surface roughness, gauging, compactors, jigs and fixtures.

***Production Management*:-** Work simplification, work sampling, value engineering. Line balancing, work station design, storage space requirement. ABC analysis, Economic order, quantity including finite production rate; Graphical and simplex methods for linear programming; transportation model; elementary queuing theory. Quality control and its uses in product design. Use of X.R.P. and C charts, Single sampling plans, operating characteristics curves. Average sample size, Regression analysis.

PART-II

***Thermodynamics*:-** Applications of the first and second laws of thermodynamics. Detailed analysis of thermodynamic cycles.

Fluid Mechanics:- Continuity, momentum and energy equations. Velocity distribution in laminar and turbulent flow, dimensional analysis. Boundary layer on a flat plate. Adiabatic and isentropic flow, Mach number.

Heat Transfer:- Critical thickness of insulation. Conduction in the presence of heat sources and sinks. Heat transfer from fins. One dimensional unsteady conduction. Time constant for thermocouples, Momentum and energy equations of boundary layers on a flat plate. Dimensionless numbers. Free and forced convection, boiling and condensation. Nature of radiant heat. Stefan Bolzmann law. Configuration factor, logarithmic mean temperature difference. Heat exchanger effectiveness and number of transfer units.

Energy Conversion:- Combustion phenomenon in C.I. and S.I. engines. Carburetion and fuel injection, Selection of pumps, classification of hydraulic turbines, specific speed. Performances of compressors. Analysis of steam and gas turbines. High pressure boilers. Unconventional power systems including Nuclear power and MHD systems. Utilisation of solar energy.

Environmental Control:- Vapour compression, absorption, steam jet and air refrigeration system. Properties and characteristics of important refrigerants. Use of psychometric chart and comfort chart. Estimation of cooling and heating loads. Calculation of supply air state rate. Air conditioning plant layout.

Environmental Science

PART-I

Life Sciences

(Basic Biology and Natural Resources)

Basic Biology

Introduction to biology, branches, scope and importance from environmental point of view. What is life?

The evolution of life on earth: Origin of life - Microbes, Plants and Animals, fossils and sediments, distribution and pattern of life in past, Paleontological evidences, Mass extinction Life

forms on Earth (all forms of plants and animals), Life in Water, Life on Land, Microbial life inair, water and soils, microbes and diseases, decomposing soil microbes, marine biology.

Taxonomic principles: History, aims, objectives, hierarchy and kingdoms, identification and nomenclature.

Classification of plants and animals based on form-relationship, species concept, organization of living things, microbial classification, Ecological Classification Systems, Collection and Herbarium, Preservation, flora, fauna, preservation of insects Ecological adaptation under various environmental conditions, Hydrophytes, Xerophytes, Halophytes, Mesophytes, Epiphytes Distribution of life on earth and factors responsible for present day distribution. Continental drift.

Natural Resources

Introduction, scope and importance of natural resources, biotic and abiotic resources Renewable and nonrenewable natural resources and their limitations.

Renewable resources: Forest and wildlife resources, forest wealth of India, animal resources, livestock and fisheries.

Food Resources: World food problems, agricultural resources, agricultural potential of India, effects of modern agriculture

Non-renewable resources: Fossil fuels – coal, oil and natural gas, Consequences of rapid consumption of fossil fuels

Fresh and marine Water resources: global distribution of fresh water and its limits, The sources of fresh water for terrestrial life, fresh water resources of India, mans water requirement, floods and droughts

Soil and Mineral resources: global status, mineral resources of India, metals and minerals Energy resources: Global energy consumption, energy needs, conventional and non-conventional energy sources, alternative energy sources, energy resources of India.

PART-II

Earth Sciences
(Environmental Chemistry and Basic Geosciences)

Environmental Chemistry

Chemistry of atmosphere, Chemical reactions involved in atmosphere, chemistry in ozone depletion, chemical reactions of global warming

Chemistry of water, unusual physical properties, changes in water properties by addition of solute, hydrogen bonding, gases present in water, basic reversible and irreversible reactions in water, sources of cations and anions in water, changes in water properties by addition of solute Stichiometry, Gibb's energy, chemical potential, chemical equilibria, acid-base reactions, solubility product, carbonate system

Chemistry of carcinogenic compounds and their effects on human body.

Surfactants: Cationic, anionic and non-ionic detergents, modified detergents.

Pesticides: Classification, degradation, analysis, pollution due to pesticides and DDT problems Lead and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence. Mercury and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence.

Hydrocarbons: Chemistry of hydrocarbon decay, environmental effects, effects on macro and microorganism.

Destruction of some hazardous substances: acid halide, anhydrides, cyanides and cyanogens bromides, chromium, aflotoxins, halogenated compounds.

Basic Geosciences

Atmosphere: Evolution, structure and chemical composition of atmosphere.
Temperature measurement and controls, Environmental lapse rate, dry and wet adiabatic lapse rate, inversion of temperature and atmospheric stability.
Atmospheric pressure and winds, factors affecting on wind, Forms of condensation, precipitation, hydrological cycle.
Internal structure of earth, Geological evolution, plate tectonic, formation of lithosphere. Continental and oceanic crust formation.
Types of rocks, Rock cycle, basic minerals of rock, clay minerals, mineral chemistry.
Soil and its formation, weathering processes, soil profiles, physical and chemical properties of soil, composition of soil. Macro and micro plant nutrients in soil, Soil classification, Soils of India.

FORESTRY
PART—I

1 Silviculture

1.1 General Silvbiculture Principles : ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation of Forests methods of propagation, grafting techniques site factors nursery and planting techniques nursery beds polybags and maintenance, water budgeting grading and hardening of seedlings special approaches, establishment and tending.

1.2 Silvicultural Systems- clear felling uniform, shelter wood, selection coppice, and conversion systems, Management of silvicultural system of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to nplantation silvitural choice of species, establishment and management of standards, seeding thining.

1.3 Silviculture of Mangrove and Cold deset: Managrove habitate and characteristics mangrove, plantation establishment and rehabilitation of degraded mangrove formations, silvitural systems for mangrove, protection of habitats, against natural disasters.
Cold desert- characteristics, identification and management of species.

1.4 Silviculture of trees: Tradition and recent advances in tropical silvicultural research and practices, Silviculture of some of the economically important species in India such as Acacia catechu, Acacia nitotica, Acacia auriculiformis, Albizzia Albizzia procera Anthocephalus cadamba, anogeissus latifolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea, Casuarina equisetifolia Cedrus deodara, Eucalyptus spp, Gnelina Arborea Hardwickia binata, Iargerstoremia Lanceolata, Pinus rosburghi, Populus SPP, Pterocarpus marsupium, Prosopis juliflora, Santalum album, Semecarpus anacardium, Shorea, robusta, Salmalia malabaricum, Techtonagrandis, Terminlis temimtosa,Tamarindus indica.

2. Forest Ecology and Ethnobotany: Biotic and aboitic components, forest ecosystems, forest community concepts;vegetation concepts, ecological succession and climaxprimary productivity, nutrient cycling and water relation; physiology in stress environments(drought, water togging salinity and alkalinity). Forest types in India, indentification of species, composition and associations; dendrology; taxonomic classification, principles and establishment of herbaria and arporeta, Conservation of forest ecosystems. Clonal parks.

Role of Ethnobotany in Indian Systems of Medicine; Ayurveda and Unani-Introduction, nomenelature, habvitate, distribution and botanical features of medicinal and arnomatic plants, factors affecting action and toxicity of drug plants and their chemical constituents.

3. **Environmental Conservation and bio diversity:**

3.1 Environment: components and importance, principles of conservation, impact of deforestation, forest fires and various human activities like mining, construction and developmental, projects, Population growth on environment.

3.2 Bio diversity: concepts and principles, importance of bio-diversity conservation instuand ex-situ method of conservation, measurement of diversity, diversity indices, Biosphere concept, hotspots of bio-diversity, Indian bio-diversity and gene pool. Conservation efforts in india and world-wide, bio-diversity conventions and treaties.

3.3 **Pollution**- types, global warming, green hose effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring, concept of sustainable development. Role of trees and forests in environmental conservation control and prevention of air water and noise pollution, Environmental Impact Assessment, Economics assessment of watershed development vis-à-vis ecological and environmental protection.

4. **Tree improvement, Seed Technology and Biotechnology:**

4.1 General concept of tree improvement, methods and techniques, variation and its use provenance, seed source, exotics, quantitiative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement genetic testing programming, selection and breeding, for resistance to diseases, insects, and adverse environment, the genetic base, forest genetic resources and gene conservation in situ and ex-situ Cost benefit ratio economic evaluation.

4.2 **Biotechnology:** Historical developments, scope of biotechnology in agriculture, forestry and industry, Plant tissue culture, response patterns, Application of plant tissue culture in plant improvement, in vitro selection, micro propagation of forest trees and medicinal plants germ plasm conservation and enrichment, recent developments, Gene regulation, genetic engineering techniques, transgenic plants and animals, case studies with special reference to genetic modification of tree species to diseases, pest and other forms of stress. Modication of plant species to practice desired products, Bio-degradation of agriculture and forestry wastes through genetically engineered microbes.

5. **Forest Pathology:** Importance and brief history of Forest pathology, terminology concept, causes and classification of plant discases; symptomatology; stages in discase development; dissemination of pathogens; inoculums and inoculums potential; pathogenesisrole of toxins and enzymes; variability in pathogens; disease resistance; plant disease epidemics; disease forecasting; management of disease through regulatory, cultural, physical, chemical and biological methods; integrated disease management; biotechnology in plant pathology Common forest fungi diseases and methods of control. Nursery discases of important tree species.

Principal of Forest disease management Definition and scope of disease management of forestry. Importance of disease cycle and economic threshold in disease management. Principles of disease management such as exclusion, cultural, chemical, dialogical and immumization, Nature of disease resistance. Fungicides and their use in nurseries and plantations. Integration of cultural, chemical, biological and host resistance in effective disease management, Meristem and tissue culture techniques in disease management.

Bio-degration of wood in use. Types of wood decay, gross characters of decay, sapstain, different types of rots in hardwoods softwoods and their prevention, Graveyard test and decay resistant wood.

6. **Forest Entomology:** Definition importance and scope of Entomology, Definition of insect and its position in the Animal kingdom. Important characters of phylum arthropoda and class insect. External morphology of generalized insect. Insect growth and development, reproduction in insects immature states (Egg. Larvae/ nymph and pupae), metamorphosis in insects. Texonomic classification of class insects, diagnostic characters of the orders and major families of economic importance.

History and importance of Forest Entomology in india, methods and principles of pest control; Mechanical, physical, silviculture legal, biological and chemical principles and techniques of in--------pest management in forests.

Classification of forest pests; Types of damages and symptoms; factors for out break of pests, Nature of damage and management; Insect pests of forest seeds, forest nursery and standing trees of timber yielding species of natural forest (ectona, Dalbergia sp. Albiziaspp. Sandal, ailantints, Gmelina, Terminalia, Deodar, Pines); Plantation forest species (Eucalyptus, Bamboo, Casurina, neem, Acacia), Fruit trees, (Emblica, Ver, Eugenia, Tarnarind0 Insect pests of freshly felled trees, finished timbers and their management. Morphology of plant parasitic namatodes, brief classification of important genera of nematodes, important diseases caused by different genera and their management practices.

7. **Wildlife Management and Conservation:** History of wildlife management and conservation in India; cultural background, Habitate management: purposes, principles, practices and tools-fire, cutting, grazing, Habitat interspersion and edge effect. Provision of water saltlicks and food. Soning core, buffer, tourism and multiple use in protected areas. Wildlife damage control; Mitigating, human wildlife conflict-fences, trenches, walls, lure crops, repellents, translocation and compensation.

Captive wildlife; Zoos and safari parks, Captive breeding for conservation, Role of Central Zoo Authority of India.

Wildlife census; Purpose, techniques, Direct and indirect methods of population estimation, Sample and total counts, indices, encounter rates and densities.

Wildlife (Protection) Act, 1972, Protected areas – Sanctury National Partk and Biosphere Reserves, Special projects for Wildlife conservation . Project Tiger and Musk Deer Project. Introduction and reintroduction of species, Wildlife corridors, MAB, Red Date book, Category of threat, CITES, Conservation, meaning, principles and strategies, in-situ and ex-situ conservation, conserving bio-diversity, Politics-socio-economic, role of education and extension.

8. **FOREST MANAGEMENT**

8.1 **Forest Management and Management Systems:** Objective and principles; techniques; forest management systems – their evolution and application world forestry systems, Forest sources and forestry practices in different regions of the world, international forestry organizations; stand structure and dynamics, sustained yield relation, rotation normal forest growing stock regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches, viz. (1) site-specific planning (ii) strategic planning (iii) Approval, sanction and expenditure (iv) Monitoring (v0 Reporting and governance. Range land management – need and importance. Distribution, characteristics, status and management of range lands, ecology and range lands and impact of grazing, range land inventory mythology -----age equipment techniques, alpine pastures, their importance in nomadic grazing and growth of medicinal shrubs and herbs.

8.2 **Forest Working plans**: Forest Planning evaluation and monitoring tools and approaches for integrated planning, multipurpose development of forest resources and forest industries development; working plans and working schemes, their role in nature conservation, bio-diversity and other dimensions; preparation and control. Divisional Working Plans, Annual plan of Operations.

8.3 **Forest mensuration, Inventory and Statistics:** Methods of measuring – diameter girth height and Volume of trees; form –factor; volume estimation of stand, current annual increment; mean annual increment, Sampline methods and sambleplots.

Yield calculation; yield and stand tables, Forest inventory –definition, object, kind of enumeration, Sampling-advantages, kinds of sampling, random sampling simple, stratified, multiphase sampling non-random sampling selective, Systematic and sequential sampling. Sampling design, size and shapes of sampling, units. Point sampling; horizontal and vertical point sampling, forest cover monitoring through remote sensing; Geographic, Information Systems for management and modeling, Forest statistcs- Definition and scope, collection of data and their presentation, measures of central tendency; lawa of probability, linear correlation and its measure, tests of significance, sampling methods and designs, analysis of variance.

8.4 **Surveying and Forest Engineeraing:** Forest surveying – different methods for surveying maps and map reading, Basic principles of forest engineering, Buidling materials and construction , Roads and Bridges; General principles; objects, types, simple design and construction of timber bridges.

9. **Forest Protection:** Injuries to forest, abiotic and biotic actors, destructive agencies, insect-pests and disease, effects of air pollution on forests and forest die bck. Susceptibility of forests to damage, nature of damage, cause, prevention, perfective measures and benefits due to chemical and biological control. General forest protection against fire equipment and methods, controlled use of fire, economic and environmental cost; timber salvage operations fter natural disasters, Role of afforestation and forest regeneration in absorption of CO2. Rational and controlled grazing, different methods of control against grazing and browing animals; effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, --- fencing, theft, shifting cultivation and control.

10. **Watershed Management and Hydrology:** concepts of watershed: role of mini-forests and forest trees in overall resource management, forest hydrology, water development in respect of torrent control, river channel stabilization, avalanabe and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental fuction of forests; water-harvesting and conservation; ground water recharge and watershed management; role of integrating forest trees, horticulture crops, field crops, grass and fodders, Hydrology, Water resources and Engineering – Hydrological cycle, presipitation, evaporation, transpiration, depression, storage, infiltration, overland flow, hydrograph, flood frequency analysis, flood estimation, flood routing through a reservoir Water logging-its causes and control, design of drainage system, soil salinity, river training- principles and methods.

11. **Water science and Technology:** Wood as raw material, kinds of woodhardwood, soft-wood, bamboos and palms, wood as raw material,. The physical features of wood Mechanical properties of wood. Suitability of wood for variousend-uses based on mechanical and physical properties. Electrical and acoustic properties of wood.

Wood water relationship-shrinkage, swelling, movement, fibre saturation, and equilibrium moisture contract, Wood seasoning – merits, principles and types – air seasoning, kiln seasoning,

chemical seasoning, Refractory classes of timbers kiln schedules, Seasoning defects and their control. Wood preservation-principles, processes, need, Types of wood preservatives (Water-soluble, oil based, etc.) classification of timbers based on the----------General idea about fire retardant and their usage.

Non-pressure methods – steeping, dipping, soaking open tank process, Boucherie process, pressure methods – full cell process, emptycell process (Lutory and Ruping) Wood machining.

Sawing- techniques, kinds of sews –cross cut saw, edging saws, cudless saws; handsaw, and circular saw, quarter sawing bow saws, Wood working, tools used in wood working (parting tools, slicing tools, shaping tools, measuring and marking tools, various stages of wood working. Dimensional stabilization of wood by surface coating method bulking method and impregnation of resins and polymers.

12. **Computer application in Forestry:** Introcduction to computers –Hardware, software, firware, Components of computer system-Central Processing Unit, Input output devices, Operating system – Batel Processing, Multi-user, Personal computer operation. Computer languages – Machine language, assemble language, high level languages, Compilers and interpreters. Problem solving on a computer simple algorithms, flowchart marking, BASIC language, constants and variable, Operations- arithmetic, relational and logical operations.

Writing simple programmes in BASIC language to compute the Mean Variance Correlation Regression, work processing and spreadsheets, preoaratuib of forest databases.

13. **Remote Sensing and GIS in Forestry:** Principle, forest cover mapping through remote sensing, use of remote sensing in forest inventories, GIS fundamentals, GIS in modeling and management of forest resources.

PART-II

1. **Social, Agro and Farm Forestry:**

1.1 Social Forestry: Objective, scope and necessity, evolution of social forestry in India, people participation, experiences of Social Forestry Projects in India.

1.2 **Agro – Forestry:** scope and necessary, place of Agro-forestry in National Forest Policy, role in the life of people and domestic animlas and integrated land use, planning especially related to (i) soil and water conservation: (ii) water recharge; (iii) nutrient availability to crops; (iv) pasture and eco-system preservation, including ecological balances through pest-predator relationships and (v) providing opportunities for enhancing biodiversity, medicinal and other flora and fauna, Agro forestry systems under different agro-ecological zones; selection of species and role of multipurpose trees and NTFPs techniques, food, fodder, fodder and fuel security. Research and Extension needs, social forestry in Himachal Pradesh, Van mahotsava and Chipko movement.

1.3 **Farm Forestry:** definition, its resemblance and difference from agroforestry, farm wood lots. High-density plantations. Economics of farm forestry; Different farm forestry systems – tagunya, shifting cultivation, alley cropping, wind braks, shelterbelts, dryland and wetland farm forestry.

1.4 **Tribology:** tribal scen in India; tribes, concept of rages, principles of social grouping, stages of tribal economy, education, cultural tradition, customs, othes and participation in forestry programmes with special reference to Himachal Pradesh.

2. **Joint Forest Management:** Need principles, objectives, methodology, scope, benefits and role of NGOs mahila mandals and other voluntary organizations, details of steps involved such as formation of Village Forest Committees, Joint Forest participatory Management committees.

3. **Forest Resources and Utilization:** Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation systems, Storage and sale Non-Timber Forest Products(NTFPs) definition and scope.

Need and importance of wood seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilris Composite wood; adhesibes –manufacture, properties, uses, plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle hoards manufacture properties, uses. Presestatus of composite wood industry in India in future expension plans. Pulp-pager and rayon; present position of supply of raw material to industry, wood substitution, utilization of plantation wood; problems and possibilities.

Anatomical structure of wood, defects and amnormalities of wood timber identification – general principles.

4. **Non-Timber Forest Products:** Introduction, fodder, grasses and tree leaves, canes and bamboos, and their uses, methods of collection of Non-timber Forest products (NTFPs), Essential Oils, extraction classification. Storage and uses, Non essential oils –nature, occurrence, methods of extraction of oils from seeds, Important oil yielding trees. Gums and Resina- sources, collection and uses, the occurrence and origin of gums in plants, properties of gums, important Indian gums, uses of gums, resins and oleoresins, formation of resins in plants, classification of resins, Tans and Dyes-nature and kinks of tannins, Dyes-classification and sources of dyes, Beedi leaves, sources collection and processing, Fibres and Flosses, Cutch and Katha –sources, extraction and uses, Drups, Spices, poisons and Biopesticids.

5. **Marketing and Trade of forest Produce:** Basic concepts of demand, supply of forest produce, demand, demand and supply schedules, types of markets for timber and non-timber forest produce, market iocations of timber and non-timber forest produce and their features,---------- forests.

Price determination in timber and non-timber forest produce, Economic feature of specialized markets in terms of degree and type of competition in buying and selling, price spread, costs of marketing functions involved like pre-commercial thinning, commercial thinning, harvesting hauling, sawing, transportation, treatment of wood carpentry, and other processing activities involves in teak-wood, rose wood, match wood, pulpwood, sandalwood, veneers-type and degree of competition in market for services of sawmill and other intermediate wood processing industries, price spreads across different channels of marketing, Economic features of specialized markets in terms of degree and type of competition for bamboo, canes, lacs, gums, resins, hides and skins forest based medicinal plants and trees and trees and other non-timber forest products.

Economics of gathering medicinal plants from forests Economics of processing medicinal plants.

Domestic demand and trade in timber and non-timber forest products.

International demand and trade in timber and non-timber forest product. Market inefficiencces in timber, non-timber forest produce ----------.

6. **Forest Soils, Soil Conservation:** Forest Soils, classification, factors affecting soil formation; physical; chemical and biological properties, Soil Conservation- definition, causes for erosion; types-wind and water erosion; conservation and management of eroded soil/ areas wind breaks shelter heits sand dunes; reclamation of salins and alkinline soil water logged and other waste lands. Role of Forests as conserving soil organic matter, provision of lopping for green leaf manuring; forest leaf litter and composting; Role of micro- organisms in ameliorating soils N and C cycles, VAM.

7. **Forest Economics:** Fundamental principles, cost-benefit analysis; estimation of demand and supply; analysis of trends in the national and international market and changes in production and consumption patterns; assessment and projection of market structures; role of private sector and co-operatives; role of corporate financing, Socio-economic analyses of forest productivity and attitudes; valuation of forest goods and service.

8. **Forest Policy & legislation:** Policy-definition, necessity and scope Legal and institutional approaches to forest resource management. National Forest Policies, Forest Law, Legal definition Objects of special forest Law Indian Forest Act Detailed study of IFA, 1927. HP State Forest Acts and Rules, History of forest development Indian Forest policy of 1894, 1952 and 1990. National Forest Policy, 1988 of Peiople's involvement, Joint Forest Management, involvement of women; Forestry Policies and issues related to land use timber and non-timber products sustainable forest management; industrialization policies; institutional and structural changes. Decentralization and Forestry Public Administration, Forest laws, necessary, general principles, Indian Forest Act, 1927 (Forest Conservation Act, 1980; Wildlife protection Act, 1972 and their amendments; Application or Indian Penal code to forestry Scope and objectives of Forest inventory. History of Forest Development in India, Forest Policy of 1894, 1952 and amendment of 1980. Forest Law –its necessity Indian Forest Act, 1927; Forest Conservation Act, 1980.

9. **Extension & Education:** meaning definition nature; scope objectives; principles approaches and history, Forestry extension; process principles and selected programmes, ICFRE and its institutes; People's participation in forestry programmes; motivation of women community; children youth and voluntary organizations for forestry extension work, Rural Development, meaning , definition, objective and genesis. Transfer of technology programmes like ORP, LLP, ND, FLD, KUK, TARP etc. of ICAE.

10. **Communication:** meaning, definition, elements and selected models, Audio visual aids meaning, importance, classification and selection, programme, planning process-meaning scope. Principles and steps, Evaluation meaning, importance and methods. Scope importance of PRA & RRA. Management and administrationmeaning, definition, principles and functions. Concepts of human resource development (hRD) rural leadership.

11. **Project Planning, monitoring & evaluation:** Needs, scope and types of projects, project methodology, components and cycle, stages of project formulation, projet budgeting, sensitivity analysis, cost benefit ratio and analysis, need for project monitoring and evaluation. M7F techniques and methodology.

GEOLOGY
PART-I

1. Physical Geology and geomorphology - Origin, structure, interior and age of the Earth Geosynclines and Mountains. Isostasy. Origin of continents and oceans. Continental drift. Seismology, Volcanology, Geological action of surface agencies.

2. Structural and field geology - Common structure of igneous, sedimentary and metamorphic rocks, study of folds, faults, inconformities, joints and thrusts. Elementary ideas of methods of geological surveying and mapping.

3. Stratigraphy and Palaemology - Principles of Stratigraphy. Indian Stratigraphy. Lithological and Chronological sub-division of Geological record. Fossils, nature and its mode of preservation, bearing or organic evolution, Invertebrate and plant fossils.

PART-II

1. Crystallography and Mineralogy - Elements of crystal forms and symmetry. Laws of Crystallography. Crystal systems and classes, Crystal habits. Twinning. Stereographic projections. Physical, chemical and optical properties of minerals, study of more important rock-forming and economic minerals regarding their chemical, physical properties, crystallographic and optical characters; alterations, occurrence and commercial uses.

2. Economic Geology - Theories of Ore genesis. Classification, geology, occurrence, localities and resources of chief metallic and non-metallic minerals of India, Mineral industries in India. Principles of geophysical prospecting and ore dressing.

3. Petrology – Origin, constitution, structure and classification of igneous, sedimentary and metamorphic rocks. Study of common Indian rock types.

HORTICULTURE

PART-I

Fruit Industry in India and its potential. General principles of cultivation. Method of propagation. Physiological basis of rooting. Special plant growing structures – mist propagation, green house and glass house. Promising root stocks for fruit crops. Plant growth regulators, retardants and inhibitors relating to flowering, sex expression, fruit set, fruit development and ripening. Dormancy and rest and rest period. Pollination and fruit set. Growth and fruiting habits of fruits and nut species. Parthenocarpy. Orchard management practices, manure and manuring, irrigation, training and pruning high density planting. Fruit thinning and fruit drop.

Origin, history, pomological description, climatic requirements and production techniques of important temperate, sub-tropical and tropical fruit crops. Important pests, diseases and physiological disorders and their management. Integrated management of pests and diseases. Harvesting and harvest maturity indices. Handling and marketing problems of major fruits. Special problems of production. Principal methods of preservation. Important fruit and vegetable products. Processing techniques and equipments. Wastes from processing factory and their impact on environment. By-products and utilization. Nutritive value of fresh and processed fruits and vegetables. Standards of fruit and vegetable products. Economic principles in fruit and vegetable production. Use of planning and budgeting techniques. Efficiency measures of orchard management.

Extension education and its importance. Methods of evaluation of extension programmes. Socioeconomic survey and status of different categories of farmers. Training programmes for extension workers. Lab to field and T&V programmes.

PART-II

Importance, nutritive value and classification of vegetables. Types of vegetable gardening. Principle of vegetables, cultivation including nursery management. Climatic requirement and cultivation of major summer and winter vegetable crops. Off-season vegetable production. Diseases and pests of vegetable crops and measures to control.

Weeds, their characteristics and association with various vegetable crops. Principles of plant breeding in the improvement of major vegetable crops. Methods of breeding of self, cross-pollinated and vegetatively propagated crops. Seed technology and its importance. Production, processing, testing and marketing of vegetable seeds.

Plant physiology and its significance. Growth and development factors affecting growth. Absorption and translocation of water transpiration and water economy. Modern concepts of photosynthesis and respiration. Processes and factors of soil formation. Mineral and organic constituents of soil and their role in maintaining soil productivity. Plant nutrient elements in soils and their availability. Nitrogenous, phosphatic potassic and micronutrient fertilizers and their use. Problem soils and their reclamation. Water conservation and watershed management. Water use efficiency in relation to crop production. Criteria for scheduling irrigation, ways and means of reducing run off losses. Importance and scope of floriculture, landscaping and interior-scaping. History, theory and principles of landscape, planting and lawns. Beautification of slopes, forests and wastelands. Layout of home gardens and public parks. Propagation of ornamentals. Cultural requirement of ornamental trees, shrubs, climbers, bulbs and annuals for winter and summer season. Production technology and post harvest management of cut flowers, bulbs, house plants and bedding plants.

MATHEMATICS

PART-I

MATHEMETICS PURE

(1) ***Algebra***:- Sets, Union, Intersection difference and complementation properties, Venn Diagram. Properties of natural numbers. Real numbers and their representation by decimals. Complex number, Argand Diagram. Cartesian Product Relation. Mapping. Function as a mapping. Equivalence relation. Groups, Isomorphism or groups. Sub-groups, Normal sub-groups. Legrange's theorem . Frobenius theorem.

The definitions and illustrations of rings and field. Divisors of zero and Homomrohisms. Vector spaces.

Determinants addition, sub-straction, multiplication and inversion of matrix. linear homogeneous and non-homogeneous equations, Cayley Hamilton theorem.

Elementary number of theory. Fundamental theorem of arithmetic. Congruences. Theorems of Format and Wilson. Inequalities. Arithmetical and Geometrical means. Inequalities of Caucuy, Schwz, Holder and Minkowsky.

(2) Infinite sequences and series:- Concept of limit infinite series. Convergent, divergent and oscillatory series. Caucuy's general principle of convergence. Comparison and ratio test. Guess's test. Absolute convergence and de-arrangements of series.

(*3*) ***Trigonometry***:- De Movine's theorem for rational index and tits applications. Inverse, Circular and Hyperbolic functions. Expansions and summation of trigonometrical series. Expressions for sine and cosine in terms of infinite products.

(4) ***Theory of Equation***:- General properties of polynomial equation. Transformation of equations.Nature of the roots of cubic and biquadratic, Cardan's solution of the cubic, Resolution of biqadratic into quadratic factors. Location of roots and Newton's method of divisors.

(*5*) ***Analytic Geometry of two and three dimentions***:- Straight lines. Pair of straight lines, Circle, system of circle. Ellips Parabola, Hyperbola, Reduction of second degree equation to a standard form. Plane, straight lines, sphere, cone, concides and their tangent and normal properties (Vector methods will be permissible).

(6) ***Analysis*:-** Concept of limit, continuity, derivation, differentiability of a function of one real variable, properties of continuous functions. Characterisation of discontinutes. Mean value theorems. Evaluation of indeterminate forms. Taylor's and Maclrauin's theorems with Laran's and Cauchy's form of remainders. Maxima and minima of function of one variable. Plane curves, singular points, curvature curve tracing. Envelopes, Partial differentiation. Differentiability of function of more than one real variable. Standard methods of integration. Rirman's definition of definite-integral of continuous function. Fundamental theorem of integral culculus. First mean value of theorem of integral culculus. Rectification, quadrature volumes and surfaces of solids of revolution and their applications.

(*7*) ***Differential Equation***:- Formation of ordinary differential equation order and degree. Geometrical demonstration of the existing theorem for sx/sy = S(x,y.). First order linear and nonlinear. equations. Singular points. Singular solutions. Linear differential equations and their important properties. Liners differential equations with constant co-efficients. Cauchy-Euler type of equations. Extcta differential equations and equations admitting integrating factor. Second order equations. Changing of dependent and independent variables, Solution when integral is known variation of parameters.

PART-II
MATHEMATIC APPLIED

(*1*) ***Vector Analysis***:- Vector Algebra , Differentiation of Vector function of a scalar variable. Gradient, Divergence and Curl in Cartesion, cylindrical and spherical co-ordinates and their physical interpretation. Higher order derivatives. Vector identities and Vactor equations. Guess and Stocks theorems.

(*2*) ***Static*:-** Fundamental laws of Newtonian Mechanics. Theory of Dimension. Plan Statics. Equilibrium of system of particles. Works and potential energy, Centre of mass and centre of gravity.Frictions, common Catenary, Principle of virtual work. Stability of equilibrium. Equilibrium of forces in three dimensions.

Attraction potential of rods, rectangular and circular discs, spherical shell, sphericel equipotential surfaces and their properties. Properties of potentials. Greens equivalent stratum. Laplacels and Poissons equations.

(3) ***Dynamics*:-** Velocity vector, Relative velocity. Acceleration. Angular velocity. Degrees of freedom and constraints. Rectilinear motions; Simple harmonic motion. Motion in a plane. Projectiles. Constrained motion. Work and energy. Motion under impulsive forces. Kepler's laws, Orbits under central forces. Motion of varying mass. Motion under resistance. Moments and

products of inertia. Two dimensional motion of a rigid body under finite and impulsive forces. Compound pendulum.

(4) Hydrostatics:- Pressure of heavy fluids. Equilibrium of fluids under given system of forces. Centre of pressure. Thrust on curved surfaces. Equilibrium of floating bodies. Stability of equilibrium. Pressure of gases and problems relating to atmosphere.

PHYSICS
PART—I

***1. Mechanics*:-** Galileans, Transformation, concept of mass and Newton's laws of motion conservation laws, Motion of rigid bodies, Coriolis Forces, Kepler's laws of gravitation, measurement of 'F' of Artificial satellites. Fluid motion, Bernoullis theorem, circulation, Reynold number, turbulence. Viscosity, surface tension, Elasticity, Relativistics mechanic and simple applications, elements of general relativity.

***2. Thermal Physics*:-** Perfect gas, Vander Weals equations. Laws of Thermodynamics. Production and measurement of low temperatures. Kinetic theory of gases; Brownian motion. Black body radiation. Plank's law. Specific heat of gases and solids. Thermionic emission. Fermi Dirac and Bose-Einstein distribution laws. Thermal ionization. Elements of irreversible thermodynamics. Solar energy and its utilisation.

***3. Waves and Oscillations*:-** Oscillations with one and two degrees of freedom, forced vibrations and resonance wave motion. Phase and group velocity.

Huygen's Principle, Reflection, refraction, interference, diffraction and polarization of waves, Optical instruments and resolving power. Multiple beam interference. Ex-M. wave equation, Fresnels formula, normal and anomalous dispersion coherence. Laser and its application.

PART-II

Poisson's and Laplace's equations and simple applications. Dielectric and polarization, capacitors. Dia-para and ferromagnetic materials. Kirchhoffs laws. Amperes law, Faradays laws of electromagnetic induction. L.C.R. circuits, alternating currents, Maxwll's equations.

***Atomic Physics*:-** Bohr's theory, Electron spin, Lande's factor. Paul's principle. Spectre of one electron system. Zeeman effect, wave particle. Elements of X-ray spectra. Compton scattering. Wave particle duality, Schrodinger's equation and simple applications. Uncertainty principles.

Basic properties and structure of nuclei, mass spectrometry, radio activity, mechanism, band and decay, properties of neutron, electron microscope, nuclear fission and reactor, nuclear fusion, cosmic ray showers, pair production. Simple properties of elementary particles. Symmetry in physical laws.

***Electronics*:-** Electron emission from solids, Child-Langmuir Law, Static and dynamic characteristics of diodes, triodes, tetrodes and pentodes; thyraton. Band structure of metals and semiconductors, doped semiconductors; P-N diodes, transistor.

Simple (vacuum tubes and transistor) circuits for Rectification, amplification, oscillation, modulation and detection of r.f. waves. Basic principles of radio reception and transmission. Television. Elementary principles of microscope solid state device.

STATISTICS
PART-I

(*1*) ***Probability***:- Classical and Statistical definitions of probability, Simple theorems of probability with examples. Conditional probability and statistical independence. Bayer's theorem. Random variables – Discreet and continuous. Probability function and probability density functions. Probability distribution in one or more varieties. Mathematical expectations. Chebyshev's inequality, weak-law of large numbers. Simple form of central limit theorem.

(*2*) ***Statistical methods***:-Compilation, classification, tabulation and diagrammatic representation of various types of statistical data.

Concepts of statistical population and frequency curve, measures of central tendency and dispersion, moments and cumulants. Measures of Skewness and Kurtosis. Moment-generating functions. Study of standard probability distributions. Binomial, Poison, Hypergeometric, Normal, Negative, Binomial rectangular and log normal distributions. General description of the Pearsenian system of curves.

General properties of a bivariate distributions, bivariate normal distribution. Measures of association and contingency, Correlation and Linear regression involving two or more variables. Correlation ratio. Interclass correlation, Bank correlation. Nonlinear regression analysis.

Curve fitting by methods of free hand curves, moving average's, group average, least squares and movements. Orthogonal polynomials and their uses.

(*3*) ***Sampling distribution and statistical inference***:- Random sample statistics, concepts of sampling distribution and standard error.

Derivation of sampling distribution of mean of independent normal varieties X2 T and F Statistics, their properties and uses. Derivation of sampling distributions of sample means, variances and correlation coefficient from a vicariate normal population. Derivation (in large samples) and uses Pearsonian X2.

(**4**) ***Theory of Estimation***:- Requirements of a good estimates/ unbiasedness, consistency, efficiency and sufficiency. Cramer-Rao lower bound to variance of estimates. Best linear unbiased estimates.

Methods of estimation, General descriptions of the methods of moments, Methods of maximum likelihood method, of least squares and method of minimum x2 properties of maximum likelihood estimators (without proof). Theory of confidence intervals, sample problems of setting confidence limits.

PART-II

***Theory of testing of Hypotheses*:-** Simple and composite hypotheses. Statistical test and critical regions. Two kinds of error, level of significance and power of test. Optimum critical regions of simple hypotheses concerning one parameter. Construction of such regions for simple hypotheses relating to a normal population.

***Likelihood ratio tests*:-** Tests involving mean, variance correlation and regression co efficient in univariable and bivariate normal population. Simple, non-parametric tests, sign, runmedian, rank and randomisation tests. Sequential test of a simple hypotheses against a simple alternative (without derivation).

(I) ***Sampling techniques***:- Sampling versus complete enumeration. Principles of sampling. Frames and sampling units. Sampling and non-sampling errors. Simple random sampling. Stratified sampling. Cluster sampling, Systematic sampling. Description of multi-stage and multiphase sampling. Ratio and regression methods of estimation. Designing of sample surveys with reference to recent large-scale surveysin India.

(II) ***Design of experiments***:- Analysis of variance and covariance with equal number of observations in the cells.

Transformation of variate to stabilise variance.

Principles of experimental designs. Completely Randomised, randomised block and Latin square design. Missing plot techniques. Factorial experiments with confounding in 2s (s=2(i), 32 and 33 designs. Splitplot design. Balanced incomplete designs and simple lattice.

VETERINARY SCIENCE
PART—I (ANIMAL HUSBANDRY)

1. Animal Nutrition:

Energy sources, energy metabolism and requirements for maintenance and production of milk, meat, eggs and work. Evaluation of feed as sources of energy.

1.1 *Advanced studies in Nutrition*: Protein - sources of protein, metabolism and synthesis, protein quantity and quality in relation to requirements. Energy-protein ratios in a ration.

1.2 *Advanced studies in Nutrition Minerals*: Sources, functions, requirements and interrelationship of the basic mineral nutrients including trace elements.

1.3 *Vitamins, Hormones and Growth Stimulating substances*: Sources, functions, requirements and interrelationship with minerals.

1.4 *Advanced Ruminant Nutrition - Dairy Cattle*: Nutrients and their metabolism with reference to milk production and its composition. Nutrient requirements for calves, heifers, dry and milking cows and buffaloes. Limitations of various feed systems.

1.5 *Advanced Non-Ruminant Nutrition – Poultry*: Nutrients and their metabolism with reference to poultry, meat and egg production. Nutrient requirements and feed formulation for broilers at different ages.

1.6 *Advanced Non-Ruminant Nutrition - Swine*: Nutrients and their metabolism with special reference to growth and quality of meat production. Nutrient requirements and feed formulation for baby, growing and finishing pigs.

1.7 *Advanced Applied Animal Nutrition*: A critical review and evaluation of feed experiments, digestibility and balance studies. Feeding standards and measure of feed energy. Nutrient requirements for growth, maintenance and production. Balanced rations.

2. Animal Physiology

2.1 *Growth and Animal Production*: Pre-natal and post-natal growth, restoration growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

2.2 Milk *production and reproduction and Digestion*: Current status of hormonal control of mammary development, milk secretion and milk ejection. Composition of milk of cows and Buffaloes. Male and female reproduction organs, their components and functions. Digestive organs and their functions.

2.3 Environmental *Physiology*: Physiological relations and their regulation mechanisms of adaption, environmental factors and regulatory mechanism involved in animal behavior, methods of controlling climatic stress.

2.4 *Semen quality, Preservation and Artificial Insemination*: Components of semen, composition of spermatozoa, chemical and physical properties of ejaculated semen, factors affecting semen *in vive* and *in vitre*. Factors affecting semen preservation, composition of dilutents, sperm concentration, transport of diluted semen, deep freezing techniques in cows, sheep and goats, swine and poultry.

3. Livestock production and management

3.1 *Commercial Dairy Farming*: Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as a specialized farming, economic dairy farming. Starting of a dairy farm, capital and land requirement, organization of the dairy farm, procurement of goods. Opportunities in dairy farming. Factors determining the efficiency of dairy animals. Herd recording, budgeting, cost of milk production, pricing policy, personnel management.

3.2 Feeding *practices of dairy cattle*: Developing practical and economic rations for dairy cattle, supply of greens throughout the year, fields and fodder requirements of dairy farm, feeding regimes for day per young stock and bulls, heifers and breeding animals, new trends in feeding young and adult stock, feeding records.

3.3 General problems of sheep, goat, pigs and poultry management.

3.4 Feeding of animals under drought conditions.

4. Milk Technology

4.1 Organization of rural Milk procurement, collection and transport of raw milk.

4.2 Quality, testing and grading raw milk, quality storage grades of whole milk, skimmed milk and cream.

4.3 Processing, packaging, storing, distributing, marketing defects and their control and nutritive properties of the following milks: Pasteurised, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined, filled and flavoured milks.

4.4 Milk *Product Technology*: Selection of raw materials, assembling production, processing, storing, distributing and marketing milk products such as Butter, Ghee, Khoa, Chhaina,

Cheese, condensed evaporated dried milk and baby foods, ice cream and kulfi, bye-products, whey products, butter milk, lactose and casein, testing, grading, judging milk products and agents specifications (ISI and Agmark). Legal standards, quality control, nutritive properties, packaging, processing and operational control. Costs.

4.5 Preparation of cultured milks, cultures and their management. Vitamin-D, soft and other special milks.

4.6 Legal standards, sanitation requirement for clean and safe milk and for the Milk Plant equipment.

PART—II (Veterenery science)

Genetics and Animal Breeding: Probability applied to Mendelian inheritance. Hardy-Weinberg Law. Concept and measurement of inbreeding and heretrozygosity - Wright's approach in contrast to Malecost's Estimation of Parameters and Measurements. Fisher's theorem of natural selection, polymorphism, polygenic systems and inheritance of quantitative traits. Casual components of variation. Biometrical models and covariance between relatives. The theory of patheo efficient applied to quantitative genetic analysis. Heritability, repeatability and selection models.

1.1 *Population Genetics applied to Animal Breeding*: Population vs. individual, population size and factors changing it. Gene number and their estimation in farm animals, gene frequency and zygotic frequency and forces changing them, mean and variance approach to equilibrium under different situations. Sub-division of phenotypic variance, estimation of additive, non-additive genetic and environmental variances in Animal population, Mendelism and blending inheritance. Genetic nature of differences between species, races, breeds and other sub-specific grouping and the grouping and the origin of group differences. Resemblance between relatives.

1.2 *Breeding systems*: Heritability, repeatability, genetics and environmental correlation, methods of estimation and the precision of estimates of animal data. Review of biometerical relations between relatives, mating systems, inbreeding, out-breeding and uses. Phenotypic assertive mating. Aids to selections. Family structures of animal. population under non-random- mating systems. Breeding for threshold traits, selection index, its precision, general and specific and combining ability, choice of effective breeding plants.

Different types and methods of selection, their effectiveness and limitations, selection indices, construction of selection in retrospect, evaluation of genetic gains through selection, correlated response in animal experimentation's.

Approach to estimation of general and specific combining ability, Diallete, fractional diallete crosses reciprocal recurrent selection, inbreeding and hybridization.

2. *Health and Hygiene*: Anatomy of Ox and Fowl. Histological technique, freezing, paraffin embedding etc.

Preparation and staining of blood films.

2.1. Common histological stains, embryology of a cow.

2.2. Physiology of blood and its circulation, respiration, excretion, endocrine glands in health and disease.

2.3 General knowledge of pharmacology and therapeutics of drugs.

2.4. Vet-hygiene with respect of water, air and habitation.

2.5. Most common cattle and poultry diseases, their mode of infection, prevention and treatment etc. Immunity. General principles and problems of meat inspection, jurisprudence of Vet. practice.

2.6 Milk Hygiene**.**

3. Meat Hygiene:

3.1 Zoonosis. Diseases transmitted from animals to man.

3.2 Duties and role of Veterinarians in a slaughter house to provide their meat that is provided under ideal hygienic conditions.

3.3 By-Products from slaughter houses and their economic utilization.

3.4 Methods of collection, preservation and processing of hormonal glands for medicinal use.

4. Extension

4.1 Extension. Different methods adopted to educate farmers under rural conditions.

4.2 Utilization of fallen animals for profit - extension education etc.

4.3 Define Trysem. Different possibilities and methods to provide self-employment to educated youth under rural conditions.

4.4 Crossbreeding as a method of upgrading and local cattle.

ZOOLOGY
PART-I

(NON-CHORDATE AND CHORDATE)

1. A general survey, classification and relationship of various phyla.

2. *Protozoa* - Study of structure, life history of Paramaecium, Vorticella, Monocyotis, Malerial Parasite, Euglena, Trypanosoma.

3. *Porifera* **-** Study of structure of cycon, canal system and skeleton in porifera.

4. *Coelenterata* **–** Obelia, Aurelia (Structure and Life History), polymorphism in Hydrozoa, coral formation, metagenesis.

5. *Helminthes* **-** Planaria, Fasciola, Taenia, Ascaris (Structure and Life History). Parasitism and Parasitic adaptation, Evolution of Parasitism. Helminths in relation to man.

6. *Annelida* **-** Neries, Earthworm, Leech (detailed history)

7. *Arthropoda* - Palaemon, Scorpion, Cockroach, Crustacean Larvae. Economic importance of insects.

8. *Mollusca* - Unio, Pila, Torsion, and detossion in Gastropoda.

9. *Echinodermata* **-** Starfish, larval form of Echinodermata.

10. Structure and bionomics and classification of the following:

Balanoglossus, *Herdmania, Branchiostoma/ Scoliodon, Frog, Uromastex, Pigeon, Rabbit***.**

11. Comparative account of the various systems of a vertebrate (Digestive system, Respiratory system, Nervous system, Receptor system, Circulatory system, Urinogenital system.

12. *Retrogressive Metamorphosis, Coclom in Branchiostoma.*

PART-II

(CELL BIOLOGY, CYTOGENETICS, ANIMAL PHYSIOLOGY, EVOLUTION, EMBRYOLOGY AND HISTOLOGY)

1. *Cell Biology* **-** Cell theory, structure and function of cell and cyto-plasmic constituents; structure of Plasma Membrane, Endoplasmic reticulum, Golgi Bodies, Mitochondria, Ribosomes, Nucleus. Cell division **-** Mitosis and Meiosis.Gene structure and Function; Watson and Crick Model of DNA, replication of DNA.

2. *Cytogenetics* **–** Menedlian Laws of inheritance, recombination, multiple alleles, Mutation-natural and induced. Polyploidy. Sex determination, Cytoplasmic inheritance.

3. *Physiology* **–** Chemical composition of protoplasms. Animal Physiology; Digestion and Absorption; Respiration (including Cell Respiration). Kidney and physiology of excretion. Physiology of nerve's impulse; Physiology of muscular contraction; Physiology of Endrocrine glands, Physiology of osmoregulation.

4. *Evolution* **-** Origin of life, history of evolutionary thought. Evidences of evolution (Anatomical, embryological, comparative physiology evidence for geographical distribution, palaentological evidence).Theoriesof evolution-Lamarckism, Neolamarcism, Darwinism, New Darwinism, Hardy-Weinberg law.

5. *Embryology and Histology* **–** Gametogenesis, fertilization, types of eggs, cleavage, development upto gastrulation in Branchiostoma, Frog and Chick. Fate maps of frog and chick; Metamorphosis in Frog; Formation and fate of extra embryonic membranes in chick; formation of amnion, allentiois, and types of placenta in Mammal.

Histology of the following Tissues and Organs of Mammals:

Epitheliel Tissue, Connective tissue (connective tissue proper, cartilage, bone, blood and lymph). Muscular tissue and nervous tissue.

Histology of skin, stomach, intestine, liver, pancreas, lung, kidney, testis, ovary, spleen.

By order,
S. ROY
Principal Secretary, Forests.

वन विभाग

अधिसूचना

शिमला–2, 29 जनवरी, 2011

संख्याः एफएफई–ए(बी)2–22 / 2008–पार्ट.––हिमाचल प्रदेश की राज्यपाल, भारत के संविधान के अनुच्छेद–309 के परन्तुक द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, हिमाचल प्रदेश लोक सेवा आयोग के परामर्श से अधिसूचना संख्याः एफएफई–ए(बी)1–3 / 98 तारीख 10 मार्च, 2006 द्वारा राजपत्र (असाधारण) में प्रकाशित हिमाचल प्रदेश वन विभाग में वन परिक्षेत्र अधिकारी, वर्ग–II (राजपत्रित) के पद के भर्ती और प्रोन्नति नियम, 2006 में और संशोधन करने के लिए निम्नलिखित नियम बनाती हैं, अर्थात् :–

1. **संक्षिप्त नाम और प्रारम्भ.**––(i) इन नियमों का संक्षिप्त नाम हिमाचल प्रदेश वन विभाग, वन परिक्षेत्र अधिकारी, वर्ग–II (राजपत्रित) भर्ती और प्रोन्नति (प्रथम संशोधन) नियम, 2011 है।

(ii) ये नियम राजपत्र हिमाचल प्रदेश में प्रकाशित किए जाने की तारीख से प्रवृत्त होंगे।

2. **उपाबन्ध– ''क'' का संशोधन.**––(i) हिमाचल प्रदेश वन विभाग, वन परिक्षेत्र अधिकारी, वर्ग–II (राजपत्रित) भर्ती और प्रोन्नति नियम, 2006 के उपाबन्ध– क में,––

(क) स्तम्भ संख्या–6 के सामने आए ''21 से 26 वर्ष'' अंकों और शब्दों के स्थान पर ''21 से 31 वर्ष'' अंक और शब्द रखे जाएंगे।

(ख) स्तम्भ संख्या–7 के सामने विद्यमान उपबन्धों के स्थान पर निम्नलिखित रखा जायेगा, अर्थात्:––

''(क) (**i**) अनिवार्य अर्हता :–

अभ्यर्थी किसी मान्यता प्राप्त विश्वविद्यालय से निम्नलिखित विषयों में से कम से कम एक विषय में विज्ञान या इंजीनियरिंग में स्नातक की उपाधि (या समतुल्य अपाधि) रखता हो :

(i) कृषि,
(ii) वनस्पति विज्ञान
(iii) रसायन विज्ञान
(iv) कम्प्यूटर एप्लीकेशन / कम्प्युटर सांईस
(v) कृषि इंजीनियरिंग
(vi) रासायनिक इंजीनियरिंग
(vii) सिविल इंजीनियरिंग
(viii) कम्प्यूटर इंजीनियरिंग
(ix) विद्युत इंजीनियरिंग
(x) इलैक्ट्रोनिक्स इंजीनियरिंग
(xi) यांत्रिक इंजीनियरिंग
(xii) पर्यावरण विज्ञान
(xiii) वानिकी
(xiv) भू–विज्ञान
(xv) उद्यान–विज्ञान
(xvi) गणित
(xvii) भौतिक–विज्ञान
(xviii) सांख्यिकी
(xix) पशु–चिकित्सा विज्ञान
(xx) प्राणि विज्ञान

परन्तु यह और कि सामान्य प्रार्थी के अभ्यर्थियों को परीक्षा मे बैठने के छः अवसर दिए जा सकेंगे। अनुसूचित जाति / अनुसूचित जन–जाति / अन्य पिछडे प्रवर्ग से सम्बन्धित अभ्यर्थियों के लिए अवसरों की कोई सीमा नहीं होगी :

परन्तु यह और कि कोई सरकारी कर्मचारी जो हिमाचल प्रदेश में अधिष्ठायी / स्थानापन्न नियुक्ति पर है तो वह परीक्षा में बैठने का पात्र होगा यदि वह किसी मान्यता प्राप्त विश्वविद्यालय से उपरोक्त–वर्णित विषयों में से कम से कम एक विषय सहित स्नातक या इसके समतुल्य हो, सामान्य प्रवर्ग के अभ्यर्थी की दशा में छः अवसर के अध्यधीन तथा अनुसूचित जाति / अनुसूचित जन–जाति / अन्य पिछडा प्रवर्ग के अभ्यर्थियों के लिए अवसरों की कोई भी सीमा नहीं होगी। इन अवसरों में अभ्यर्थी द्वारा सीधी भर्ती की दशा में प्राप्त किए गए अवसर भी सम्मिलित होंगे।

परन्तु यह और कि केवल वही अभ्यर्थी जो लिखित परीक्षा में उत्तीर्ण होते हैं, को ही शारीरिक परीक्षण के लिए बुलाया जायेगा और शारीरिक परीक्षण हेतु बुलाए जाने वाले अभ्यर्थियों की संख्या रिक्तियों की संख्या का पांच गुणा होगी।

(ii) (a) शारीरिक मापदण्ड

		छाती फुलाव (सें0 मी0)	
	कद (सें0 मी0)	सामान्य	फूलाकर
पुरुष अभ्यर्थी	163	79 सें0 मी0	05 सें0 मी0
महिला अभ्यर्थी	150	74 सें0 मी0	05 सें0 मी0

अनुसूचित जनजाति और ऐसे वंशों जैसे कि आसामी, भूटानी, गढ़वाली, गोरखे, कुमाऊवी, लद्दाखी, मिजों, नागा, नेपाली, सिक्कमी, और जो अरुणाचल प्रदेश, लाहौल एवं स्पिति व मेघालय से हैं, के सम्बन्धित अभ्यर्थियों की दशा में निम्नलिखित न्यूनतम कद मापदण्ड़ अनुज्ञात किये जा सकेंगे :––

पुरुष अभ्यर्थी : 152 सें0 मी0

महिला अभ्यर्थी : 145 सें0 मी0

(ख) पुरुष व महिला प्रत्याशियों को क्रमशः चार घण्टों के भीतर 25 / 16 किलोमीटर की दूरी पैदल तय करते हुए शारीरिक परीक्षण उत्तीर्ण करना होगा / होगी।

(iii) स्वास्थ्य प्रमाण पत्र :

प्रशिक्षण के लिए चयनित अभ्यर्थियों का केन्द्रीय सिविल सेवाएं विनियम के अनुच्छेद–19 द्वारा विहित प्ररुप पर अनुपूरक नियमों के तत्स्थानी नियम के तहत सम्यक रुप से गठित चिकित्सा बोर्ड द्वारा जारी चिकित्सा प्रमाण–पत्र प्रस्तुत करना होगा, जिसमें यह प्रमाणित किया गया हो कि अभ्यर्थी की श्रवण–शक्ति स्वस्थ है तथा सामान्य शारीरिक योग्यता वन विभाग में विषय बाह्य कार्य के अनुरुप है।

अभ्यर्थियों द्वारा चिकित्सा अधिकारी या सम्बद्व जिला के समतुल्य प्राधिकारी द्वारा चिकित्सा प्रमाण–पत्र प्रस्तुत करना अपेक्षित होगा।

(ख) वांछनीय अर्हता :

हिमाचल प्रदेश की रुढ़ियों रीतियों और बोलियों का ज्ञान और प्रदेश में विद्यमान विशिष्ट दशाओं में नियुक्ति के लिए अपयुक्तता।

(ग) स्तम्भ संख्या–10(क) और (ख) के सामने विद्यमान उपबन्धें के स्थान पर निम्नलिखित रखा जाएगाः––

''(क) (i) पचपन प्रतिशत प्रोन्नति द्वारा;

(ii) पैंतालीस प्रतिशत सीधी भर्ती द्वारा, यथास्थिति, नियमित आधार पर या संविदा के आधार पर भर्ती द्वारा। संविदा पर नियुक्त कर्मचारी स्तम्भ 15–क में दी गई उपलब्धियां प्राप्त करेंगे और तथाकथित स्तम्भ में विनिर्दिष्ट सेवा शर्तों द्वारा विनियमित होंगे :

(ख) वन अनुसंधान संस्थान / महाविद्यालय देहरादून या किसी अन्य स्थान पर प्रशिक्षण के लिए चयनित अभ्यर्थियों को प्रशिक्षण काल के दौरान अभ्यर्थी के संस्थान में प्रवेश की तारीख से ''सेवा–रत्त'' समझा जाएगा। प्रशिक्षण अवधि के दौरान अभ्यर्थी, सेवारत्त अभ्यर्थियों को लागू वन परिक्षेत्र अधिकारी के वेतनमान का निम्नतर स्तर में वेतन और प्रथम वर्ष के दौरान उस पर अनुज्ञेय भत्ते तथा द्वितीय वर्ष के दौरान वेतन का द्वितीय चरण प्राप्त करेगा :

परन्तु द्वितीय वेतनवृद्धि तभी प्रदान की जाएगी जब सीधे भर्ती किए गए व्यक्ति ने सम्बद्ध संस्थानों / महाविद्यालयों से विहित परीक्षाएं उत्तीर्ण कर दी हों।

(घ) स्तम्भ संख्या–11 में सामने विद्यमान उपबन्धों के स्थान पर निम्नलिखित रखा जाएगा, अर्थात्:––

''(i) बावन प्रतिशत उप वन परिक्षेत्र अधिकारियों में से प्रोन्नति द्वारा जिनका आठ वर्ष का नियमित सेवाकाल या ग्रेड में की गई लगातार तदर्थ सेवा, यदि कोई हो, को सम्मिलित करके आठ वर्ष का नियमित सेवाकाल हो;

(ii) डेढे प्रतिशत वन रक्षकों में से प्रोन्नति द्वारा जिनकी विज्ञान (वानिकी) स्नातक सहित दस वर्ष की नियमित सेवाकाल सहित लगातार तदर्थ सेवा हो और डेढ़ प्रतिशत प्रोन्नत उप वन परिक्षेत्र अधिकारियों में से प्रोन्नति द्वारा जिनकी ग्रेड में की गई लगातार तदर्थ सेवा, यदि कोई हो, के सम्मिलित करके जो स्नातक (वानिकी) की उपाधि रखते हों।

सीधी भर्ती द्वारा और विभिन्न सम्भरक प्रवर्गों में से प्रोन्नति द्वारा पद भरने के लिए रोस्टर उपाबन्ध ''ग'' के रुप मे संलग्न है।

परन्तु प्रोन्नति के प्रयोजन के लिए प्रत्येक कर्मचारी को, जन जातीय / दुर्गम क्षेत्रों में पद(पदों) की ऐसे क्षेत्रों में पर्याप्त संख्या की उपलब्धता के अध्यधीन, कम से कम एक कार्यकाल तक सेवा करनी होगी :

परन्तु यह और कि उपर्युक्त परन्तुक (1) उन कर्मचारियों के मामले में लागू नहीं होगा जिनकी अधिवर्षिता के लिए पांच वर्ष या उससे कम की सेवा शेष रही हो :

परन्तु यह और भी कि उन अधिकारियों / कर्मचारियों को, जिन्होंने जनजातीय / दुर्गम क्षेत्र में कम से कम एक कार्यकाल तक सेवा नहीं की है, ऐसे क्षेत्र में उसके अपने संवर्ग (काडर) में सर्वथा वरिष्ठता के अनुसार स्थानान्तरण किया जाएगा।

स्पष्टीकरण I.––उपर्युक्त परन्तुक के प्रयोजन के लिए जनजातीय / दुर्गम क्षेत्रों में ''कार्यकाल'' से साधारणतया तीन वर्ष की अवधि या प्रशासनिक अपेक्षाओं और कर्मचारी द्वारा किए गए कार्य को ध्यान में रखते हुए ऐसे क्षेत्रों में तैनाती की इससे कम अवधि अभिप्रेत होगी।

स्पष्टीकरण II.––उपर्युक्त परन्तुक के प्रयोजन के लिए जनजातीय / दुर्गम क्षेत्र निम्न प्रकार से होंगे:––

1. जिला लाहौल व स्पिति
2. चम्बा जिला का पांगी और भरमौर उप मण्डल।
3. रोहडू उप मण्डल का डोडरा क्वार क्षेत्र।

4. जिला शिमला की रामपुर तहसील का पन्द्रह बीस परगना, मुनिष दरकाली और ग्राम पंचायत काशापाट।
5. कुल्लू जिला का पन्द्रह बीस परगना।
6. कांगडा जिला के बैजनाथ उप मण्डल का बड़ा भंगाल क्षेत्र।
7. जिला किन्नौर।
8. सिरमौर जिला में उप तहसील कमरउ और कोरगा पटवार वृत्त, रेणुका जी तहसील के भलाड–भलौना और सांगना पटवार वृत और शिलाई तहसील का कोटा पाब पटवार वृत।
9. मण्डी जिला मे करसोग तहसील का खन्योल–बगड़ा पटवार वृत, बाली चौकी उप तहसील के गडा गोसाईं, मठयानी, घनयाड, थाची, बागी, सामे गाढ़ और खोलानाल, पद्धर तहसील के झारवाड़, कुटगढ़, ग्रामन, देवगढ़, ट्रैला, रोपा, कथोग, सिल्ह–भड़वानी, हस्तपुर घमरेड़ और भटेढ़ पटवार वृत्त, थुनाग तहसील के चियुणी, कालीपार, मानगढ, थाच–बगडा, उत्तरी मगरु और दक्षिणी मगरु पटवार वृत्त और सुन्दरनगर तहसील का बटवाड़ा पटवार वृत्त।

(1) प्रोन्नति के सभी मामलों में पद पर नियमित नियुक्ति से पूर्व सम्भरक (पोषक) पद में की गई लगातार तदर्थ सेवा, यदि कोई हो, प्रोन्नति के लिए इन नियमों में यथाविहित सेवाकाल के लिए, इस शर्त के अधीन रहते हुए गणना में ली जाएगी, कि सम्भरक प्रवर्ग में तदर्थ नियुक्ति / प्रोन्नति भर्ती और प्रोन्नति नियमों के उपबन्धों के अनुसार चयन की उचित स्वीकार्य प्रक्रिया को अपनाने के पश्चात् की गई थीः

परन्तु उन सभी मामलें में जिनमें कोई कनिष्ठ व्यक्ति सम्भरक पद में अपने कुल सेवाकाल (तदर्थ आधार पर की गई तदर्थ सेवा सहित, जो नियमित सेवा / नियुक्ति के अनुसरण में हा) को आधार पर उपर्युक्त निर्दिष्ट उपबन्धों के कारण विचार किए जाने का पात्र हो जाता है, तहां अपने–अपने प्रवर्ग / पद / काडर में उससे वरिष्ठ सभी व्यक्ति विचार किए जाने के पात्र समझे जाएंगे और विचार करते समय कनिष्ठ व्यक्ति से ऊपर रखे जाएंगे :

परन्तु यह और कि उन सभी पदधारियों की, जिन पर प्रोन्नति के लिए विचार किया जाता है, की कम से कम तीन वर्ष की न्यूनतम अर्हता सेवा या पद के भर्ती आरै प्रोन्नति नियमों में विहित सेवा, जो भी कम हो, होगी :

परन्तु यह और भी कि जहां कोई व्यक्ति पूर्वगामी परन्तुक की अपेक्षाओं के कारण प्रोन्नति किए जाने सम्बन्धी विचार के लिए अपात्र हो जाता है, वहां उससे कनिष्ट व्यक्ति भी ऐसी प्रोन्नति के विचार के लिए अपात्र समझा जाएगा / समझे जाएंगे।

स्पष्टीकरणः––अंतिम परन्तुक के अन्तर्गत कनिष्ठ पदधारी प्रोन्नति के लिए अपात्र नहीं समझा जाएगा यदि वरिष्ठ अपात्र व्यक्ति भूतपूर्व सैनिक है जिसे डिमोबिलाईज्ड आर्मउ फोर्सिज परसोनल (रिजर्वेशन ऑफ वैकेन्सीज इन हिमाचल स्टेट नॉन टैक्नीकल सर्विसीज) रुल्ज, 1972 के नियम–3 के उपबन्धों के अन्तर्गत भर्ती किया गया है और इनके अन्तर्गत वरीयता लाभ दिए गए हों या जिसे एक्स सर्विसमैन (रिजर्वेशन ऑफ वैकेन्सीज इन दी हिमाचल प्रदेश टैक्नीकल सर्विसीज) रुल्ज 1985 के नियम–3 के उपबन्धों के अन्तर्गत भर्ती किया गया हो और इनके अन्तर्गत वरीयता लाभ दिए गए हों।

(2) इसी प्रकार स्थाई करण के सभी मामलों में ऐसे पद पर नियमित नियुक्ति से पूर्व की सम्भरक पद पर की गई लगातार तदर्थ सेवा, दि कोई हो, सेवाकाल के लिए गणना में ली जाएगी, यदि तदर्थ नियुक्ति / प्रोन्नति उचित चयन के पश्चात् और भर्ती आरै प्रोन्नति नियमों के उपबन्धों के अनुसार की गई थी :

परन्तु की गई उपर्युक्त निर्दिष्ट तदर्थ सेवा को गणना मे लेने के पश्चात् जो स्थाईकरण होगा उसके फलस्वरुप पारस्परिक वरीयता अपरिवर्तित रहेगी।

(ङ) स्तम्भ संख्या 15–क के सामने विद्यमान उपबन्धों के स्थान पर निम्नलिखित रख जाएगा, अर्थात्:––

''इन नियमों में किसी बात के होते हुए भी पद पर संविदा नियुक्तियां नीचे दिए गए निबन्धनों और शर्तों के अध्यधीन की जाएगीः—

(I) संकल्पनाः

(क) इस पॉलिसी के अधीन वन विभाग, हिमाचल प्रदेश में वन परिक्षेत्र अधिकारी को, संविदा के आधार पर प्रारम्भ में एक वर्ष के लिए लगाया जाएगा जिसे वर्षानुवर्ष आधार पर दो और वर्ष के लिए बढ़ाया जा सकेगा :

परन्तु संविदा अवधि में वर्षानुवर्ष आधार पर विस्तारण / नवीकरण के लिए सम्बद्ध विभागाध्यक्ष यह प्रमाण–पत्र जारी करेगा कि संविदा पर नियुक्त व्यक्ति की सेवा और आचरण वर्ष के दौरान सन्तोषजनक रहा है और केवल तभी उसकी संविदा की अवधि नवीकृत / विस्तारित की जाएगी।

(ख) पद का हिमाचल प्रदेश लोक सेवा आयोग के कार्यक्षेत्र में आनाः

सचिव (वन), हिमाचल प्रदेश रिक्त पदों को संविदा के आधार पर भरने के लिए सरकार का अनुमोदन प्राप्त करने के पश्चात्, अध्यपेक्षा को सम्बद्ध भर्ती अभिकरण अर्थात् हिमाचल प्रदेश लोक सेवा आयोग के समक्ष रखेगा।

(ग) चयन, इन नियमों में विहित पात्रता शर्तों के अनुसार किया जाएगा।

(II) संविदात्मक उपलब्धियाँ :

संविदा के आधार पर नियुक्त वन परिक्षेत्र अधिकारी को 14100 / – रुपए (जो पे बैण्ड के न्यूनतम जमा ग्रेड पे के बारबर होगी) की समेकित नियत संविदात्मक रकम प्रतिमास संदत्त की जाएगी। यदि संविदा में एक वर्ष से अधिक की बढ़ौतरी की जाती है तो पश्चात्वर्ती वर्ष / वर्षों के लिए संविदात्मक उपलब्धियों में 423 / –रुपए की रकम (पद के पे–बैंड के न्यूनतम जमा ग्रेड पे का तीन प्रतिशत) वार्षिक वृद्धि के रूप में अनुज्ञात की जाएगी।

(III) नियुक्ति / अनुशासन प्राधिकारी :

सचिव (वन), हिमाचल प्रदेश सरकार नियुक्ति और अनुशासन प्राधिकारी होगा।

(IV) चयन प्रक्रिया :

संविदा नियुक्ति की दशा में पद पर नियुक्ति के लिए चयन, मौखिक परीक्षा के आधार पर किया जाएगा या यदि आवश्यक या समीचीन समझा जाए तो लिखित परीक्षा या व्यवहारिक परीक्षा के आधार पर किया जाएगा जिसका स्तर / पाठ्यक्रम सम्बद्ध भर्ती अभिकरण अर्थात् हिमाचल प्रदेश लोक सेवा आयोग द्वारा अवधारित किया जाएगा।

(V) संविदात्मक नियुक्ति के लिए चयन समितिः

जैसी सम्बद्ध भर्ती अभिकरण अर्थात् हिमाचल प्रदेश लोक सेवा आयोग द्वारा समय–समय पर गठित की जाए।

(VI) करारः

अभ्यर्थी को, चयन के पश्चात् इन नियमों से संलग्न उपाबन्ध–''ख'' के अनुसार करार हस्ताक्षरित करना होगा।

(VII) निबन्धन और शर्तें :

(क) संविदा के आधार पर नियुक्त व्यक्ति को 14100 / – रूपए की नियत संविदात्मक रकम (जो पे बैण्ड के न्यूनतम जमा ग्रेड़ पे के बराबर होगी) प्रति मास संदत्त की जाएगी। संविदा पर नियुक्त व्यक्ति आगे बढ़ाए गए वर्ष / वर्षों के लिए और संविदात्मक रकम में 423 / – रुपए (पद के पे बैंड के न्यूनतम जमा ग्रेड पे का तीन प्रतिशत) की वृद्धि का हकदार होगा और अन्य कोई सहबद्ध प्रसुविधाएं जैसे वरिष्ठ / चयन वेतनमान आदि नहीं दिया जाएगा।

(ख) संविदा पर नियुक्त व्यक्ति की सेवा पूर्णतया अस्थाई आधार पर होगी। यदि संविदा पर नियुक्त व्यक्ति का कार्य / आचरण ठीक नहीं पाया जाता है तो नियुक्ति समाप्त किए जाने के लिए दायी होगी।

(ग) संविदा पर नियुक्त व्यक्ति एक मास की सेवा पूरी करने के पश्चात् एक दिन के आकस्मिक अवकाश का हकदार होगा। यह अवकाश एक वर्ष तक संचित किया जा सकेगा। संविदा पर नियुक्त व्यक्ति को किसी भी प्रकार का अन्य कोई अवकाश अनुज्ञात नहीं होगा। वह चिकित्सा प्रतिपूर्ति और एल0टी0सी0 इत्यादि के लिए भी हकदार नहीं होगा / होगी। केवल प्रसूति अवकाश नियमानुसार दिया जाएगा।

(घ) नियन्त्रक अधिकारी के अनुमोदन के बिना सेवा से अनधिकृत अनुपस्थिति से स्वतः ही संविदा का पर्यावसान (समापन) हो जाएगा। संविदा पर नियुक्त व्यक्ति, कर्तव्य से अनुपस्थिति की अवधि के लिए संविदात्मक रकम का हकदार नही होगा।

(ङ) संविदा पर नियुक्त कर्मचारी, जिसने तैनाती के एक स्थान पर पांच वर्ष का कार्यकाल पूर्ण कर लिया है आवश्यकता के आधार पर स्थानान्तरण हेतु पात्र होगा, जहां भी प्रशासनिक आधार पर ऐसा करना अपेक्षित हो।

(च) चयनित अभ्यर्थी को सरकारी / रजिस्ट्रीकृत चिकित्सा व्यवसायी से अपना आरोग्य प्रमाण पत्र प्रस्तुत करना होगा। बारह सप्ताह से अधिक की गर्भवती महिला प्रसव होने तक, अस्थाई तौर पर अनुप्युक्त सी रहेगी। महिला अभ्यर्थियों का किसी प्राधिकृत चिकित्सा अधिकारी / व्यवसायी द्वारा उपयुक्तता के लिए पुनः परीक्षण किया जाएगा।

(छ) संविदा पर नियुक्त व्यक्ति का, यदि अपने पदीय कर्तव्यों के सम्बन्ध में दौरे पर जाना अपेक्षित हो, तो वह उसी दर पर, जैसी नियमित प्रतिस्थानी कर्मचारी को वेतनमान के न्यूनतम पर लागू है, यात्रा भत्ते / दैनिक भत्ते का हकदार होगा।

(ज) नियमित कर्मचारियों की दशा में यथा लागू सेवा नियमों के उपबन्ध जैसे एफ0आर0–एस0 आर0, छुट्टी नियम, साधारण भविष्य निधि नियम, पेन्शन नियम तथा आचरण नियम आदि संविदा पर नियुक्त व्यक्तियों की दशा में लागू नहीं होंगे। वे इस स्तम्भ में यथावर्णित उपलब्धियां आदि के लिए हकदार होंगे।

————————

उपाबन्ध–"ख"

वन परिक्षेत्र अधिकारी और हिमाचल प्रदेश सरकार के मध्य सचिव (वन), हिमाचल प्रदेश सरकार के माध्यम से, निष्पादित की जाने वाली संविदा / करार का प्ररूप

यह करार श्री / श्रीमति..... पुत्र / पुत्री श्री..... निवासी....., संविदा पर नियुक्त व्यक्ति (जिसे इसमें इसके पश्चात् **'प्रथम पक्षकार'** कहा गया है), और हिमाचल प्रदेश की राज्यपाल के मध्य .....सचिव (वन), हिमाचल प्रदेश सरकार (जिसे इसमें इसके पश्चात् **'द्वितीय पक्षकार'** कहा गया है) के माध्यम से, आज तारीख..... को किया गया।

'दितीय पक्षकार' ने उपरोक्त **'प्रथम पक्षकार'** को लगाया है और प्रथम पक्षकार ने वन परिक्षेत्र अधिकारी के रूप में संविदा के आधार पर निम्नलिखित निबन्धन और शर्तों पर सेवा करने के लिए सहमति दी है:——

1. यह कि **'प्रथम पक्षकार'** वन परिक्षेत्र अधिकारी के रूप में ..... से प्रारम्भ होने और ..... को समाप्त होने वाले दिन तक, एक वर्ष की अवधि के लिए द्वितीय पक्षकार की सेवा में रहेगा। यह विनिर्दिष्ट रूप से उल्लिखित किया गया है आरै दोनों पक्षकारों द्वारा करार पाया गया है कि प्रथम पक्षकार की द्वितीय पक्षकार के साथ संविदा, आखिरी कार्य दिवस् अर्थात्..... दिन को स्वयंमेव ही पर्यवसित (समाप्त) समझी जाएगी और सूचना नोटिस आवश्यक नहीं होगा।

   परन्तु संविदा अवधि में वर्षानुवर्ष आधार पर विस्तारण / नवीकरण के लिए सम्बद्ध विभागाध्यक्ष, यह प्रमाण–पत्र जारी करेगा कि संविदा पर नियुक्त व्यक्ति की सेवा और आचरण, वर्ष के दौरान सन्तोषजनक रहा है और केवल तभी उसकी संविदा की अवधि नवीकृत / विस्तारित की जाएगी।

2. प्रथम पक्षकार की संविदात्मक रकम 14100 / – रूपए प्रतिमास होगी।

3. प्रथम पक्षकार की सेवा बिल्कुल अस्थाई आधार पर होगी। यदि संविदा पर नियुक्त व्यक्ति का कार्य / आचरण ठीक नही पाया जाता है या यदि नियमित पदधारी उस रिक्ति के विरूद्ध नियुक्त / तैनात कर दिया जाता है जिसके लिए प्रथम पक्षकार को लगाया गया है तो नियुक्ति पर्यवसित (समाप्त) की जाने के लिए दायी होगी।

4. संविदा पर नियुक्त वन परिक्षेत्र अधिकारी एक मास की सेवा पूरी करने के पश्चात् एक दिन के आकस्मिक अवकाश का हकदार होगा। यह अवकाश एक वर्ष तक संचित किया जा सकेगा। संविदा पर नियुक्त वन परिक्षेत्र अधिकारी को किसी भी प्रकार का अन्य कोई अवकाश अनुज्ञात नहीं होगा। वह चिकित्सा प्रतिपूर्ति और एल0टी0सी0 इत्यादि के लिए भी हकदार नहीं होगा / होगी। केवल प्रसूति अवकाश नियमानुसार दिया जाएगा।

5. नियन्त्रक अधिकारी के अनुमोदन के बिना कर्तव्यों से अनधिकृत अनुपस्थिति से स्वतः ही संविदा की पर्यावसान (समाप्त) हो जाएगा। संविदा पर नियुक्त वन परिक्षेत्र अधिकारी कर्तव्य (ड्यूटी) से अनुपस्थिति की अवधि के लिए संविदात्मक रकम का हकदार नहीं होगा।

6. संविदा पर नियुक्त कर्मचारी जिसने तैनाती के एक स्थान पर पांच वर्ष का कार्यकाल पूर्ण कर लिया है, आवश्यकता के आधार पर स्थानान्तरण हेतु पात्र होगा, जहां भी प्रशासनिक आधार पर ऐसा करना अपेक्षित हो।

7. चयनित अभ्यर्थी को सरकारी / रजिस्ट्रीकृत चिकित्सा व्यवसायी से अपना आरोग्य प्रमाण–पत्र प्रस्तुत करना होगा। महिला अभ्यर्थियों की दशा में, बारह सप्ताह से अधिक की गर्भावस्था प्रसव होने तक, उसे अस्थाई तौर पर अनुपयुक्त बना देगी। महिला अभ्यर्थियों का किसी प्राधिकृत चिकित्सा अधिकारी / व्यवसायी द्वारा उपयुक्तता के लिए पुनः परीक्षण किया जाना चाहिए।

8. संविदा पर नियुक्त व्यक्ति का यदि अपने पदीय कर्त्तव्यों के सम्बन्ध में दौरे पर जाना अपेक्षित हो, तो वह उसी दर पर, जैसी नियमित प्रतिस्थानी कर्मचारी को वेतनमान के न्यूनतम पर लागू है, यात्रा भत्ते / दैनिक भत्ते का हकदार होगा / होगी।

9. संविदा पर नियुक्त व्यक्ति(यों) को कर्मचारी सामूहिक बीमा योजना के साथ–साथ ई0पी0एफ0 / जी0पी0एफ0 भी लागू नहीं होगा।

इसके साक्ष्यस्वरूप प्रथम पक्षकार और द्वितीय पक्षकार ने साक्षियों की उपस्थिति में इसमें सर्वप्रथम उल्लिखित तारीख को अपने–अपने हस्ताक्षर कर दिए हैं।

साक्षियों की उपस्थिति में :

1. .....
.....
.....
(नाम व पूरा पता)

2. .....
.....
.....
(नाम व पूरा पता) (प्रथम पक्षकार के हस्ताक्षर)

साक्षियों की उपस्थिति में :

1. .....
.....
.....
(नाम व पूरा पता)

2. .....
.....
.....
(नाम व पूरा पता) (द्वितीय पक्षकार के हस्ताक्षर)

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उपाबन्ध–''ग''

वन परिक्षेत्र अधिकारी के पद हेतु नियुक्ति रोस्टर (कुल पद = 297)

सीधी भर्ती द्वारा	=45 प्रतिशत = 134
प्रोन्नति द्वारा	=55 प्रतिशत = 163
विज्ञान स्नातक (वानिकी)	=32 प्रतिशत = 94
उप वन परिक्षेत्र	=52 प्रतिशत = 154
स्नातक विज्ञान	=13 प्रतिशत= 40
उप वन परिक्षेत्र एवं वन रक्षक, जिन्होंने विज्ञान (स्नातक) में उपाधी प्राप्त की हो	= 3 प्रतिशत = 09 (प्रत्येक को 1.1 / 2) प्रतिशत)

उप वन परिक्षेत्र अधिकारी.––1, 2, 3, 5, 6, 9, 11, 12, 14, 17, 18, 19, 21, 24, 25, 27, 31, 33, 36, 37, 40, 41, 43, 44, 47, 49, 50, 53, 55, 56, 57, 59, 62, 63, 65, 66, 71, 72, 73, 76, 78, 79, 81, 84, 85, 87, 88, 91, 92, 94, 95, 98, 100, 103, 106, 107, 109, 110, 111, 114, 116, 117, 120, 122, 123, 125, 128, 129, 130, 132, 133, 138, 139, 142, 144, 145, 146, 148, 151, 152, 154, 155, 158, 160, 161, 164, 165, 168, 170, 173, 174, 176, 177, 180, 182, 183, 184, 187, 189, 190, 192, 195, 196, 198, 199, 203, 205, 206, 209, 211, 212, 214, 217, 217, 219, 221, 222, 225, 227, 228, 231, 233, 236, 239, 240, 243, 244, 247, 249, 250, 253, 255, 256, 258, 259, 261, 264, 265, 268, 270, 273, 274, 276, 277, 280, 282, 283, 284, 287, 289, 290, 292, 295.

विज्ञान स्नातक (वानिकी).––1, 7, 10, 13, 16, 20, 23, 26, 29, 32, 35, 39, 42, 46, 18, 51, 54, 58, 61, 64, 69, 70, 74, 77, 80, 83, 86, 90, 93, 96, 101, 102, 105, 108, 113, 115, 118, 121, 124, 127, 131, 136, 137, 140, 143, 147, 150, 153, 157, 159, 162, 166, 169, 172, 175, 179, 181, 185, 188, 191, 194, 200, 202, 204, 207, 210, 213, 216, 220, 224, 226, 229, 232, 235, 238, 241, 242, 246, 248, 251, 254, 257, 260, 263, 266, 269, 272, 275, 279, 281, 285, 288, 291, 294.

स्नातक.——8, 15, 22, 30, 38, 45, 52, 60, 68, 75, 82, 89, 97, 104, 112, 119, 126, 135, 141, 149, 156, 171, 178, 186, 193, 201, 208, 215, 223, 230, 237, 245, 252, 267, 271, 278, 286, 293, 296.

उप वन परिक्षेत्र अधिकारी, विज्ञान स्नातक (वानिकी).——67, 134, 197, 262.

वन रक्षक विज्ञान स्नातक (वानिकी).——34, 99, 167, 234, 297.

रोस्टर में दिए गए बिन्दुओं द्वारा एक बार जब सभी प्रवर्गों को प्रतिनिधित्व प्राप्त होगा तत्पश्चात् रिक्ति उसी प्रवर्ग से भरी जाएगी जिस प्रवर्ग द्वारा पत्र रिक्त हुआ है।

(च) वन परिक्षेत्र अधिकारी के विद्यमान भर्ती एवं प्रोन्निति नियमों में संलग्न परिशिष्ठ के स्थान पर निम्नलिखित रखे जाएंगे :–

वन परिक्षेत्र अधिकारी, (वर्ग–II, राजपत्रित) के पद हेतु प्रतियोगिता परीक्षा के विषयों और मानकों से सम्बन्धित नियम।

1. जो अभ्यर्थी लिखित परीक्षा में उत्तीर्ण होंगे, उन्हें शारीरिक माप–दण्ड परीक्षा हेतु बुलाया जायेगा।

2. लिखित परीक्षा मे दो अनिवार्य और दो वैकल्पिक पेपर सम्मिलित होंगे।

3. अभ्यर्थी को अपने प्रार्थना पत्र में विनिर्दिष्ट उल्लेख करना होगा कि उसे कौन सा एच्छिक पेपर करना है। परन्तु उसे पेपरों में कोई परिवर्तन करने की स्थिति में उसे सचिव, हिमाचल प्रदेश लोक सेवा आयोग को आवेदन प्राप्त होने की अन्तिम तारीख से पहले सूचित करना होगा।

4. अभ्यर्थी को वैकल्पिक पेपर का उत्तर अपने विकल्प पर केवल अंग्रेजी या हिन्दी में ही देना होंगे।

5. कोई भी अभ्यर्थी लिखित परीक्षा में उत्तीर्ण नहीं समझा जाएगा जब तक कि वे प्रत्येक अनिवार्य पेपर में कम से कम 40 प्रतिशत अंक और समेकित रुप से 45 प्रतिशत अंक प्राप्त नहीं कर लेता।

6. यह और कि लिखित परीक्षा में बराबर न्यूनतम उत्तीर्णांक प्राप्त करने की स्थिति में यदि अभ्यर्थियों के मध्य बराबरी हो जाए तो ऐसे सभी अभ्यर्थियों को मौखिक परीक्षा हेतु बुलाया जायेगा।

7. मौखिक परीक्षा हेतु बुलाये जाने वाले अभ्यर्थियों के नाम, लिखित परीक्षा में प्राप्त कुल अंक के आधार पर गुणनुक्रम में क्रमाकित किये जाएंगे।

8. अंग्रेजी पेपर में प्राप्त अंकों को छोड़ कर अन्य सभी अनिवार्य एवं वैकल्पिक पेपरों में प्राप्त अंकों के आधार पर वरियता क्रम निश्चित किया जायेगा परन्तु उत्तीर्ण होने के लिए प्रत्यके वैकल्पिक पेपर में 40% अंक लेना अनिवार्य होगा।

9. अन्तिम वरीयता क्रम अभ्यर्थी द्वारा मुख्य परीक्षा (लिखित व मौखिक) में प्राप्त अंकों के आधार पर अवधारित किया जाएगा।

10. बराबरी की स्थिति मे मैरिट का क्रम अभ्यर्थी द्वारा मौखिक परीक्षा में लिए गये अंकों के आधार पर अवधारित किया जाएगा। यदि अभ्यर्थियों के मौखिक परीक्षा के अंक भी बराबर हों तो मैरिट का क्रम अभ्यर्थी द्वारा अनिवार्य विषयों में समेकित रुप मे प्राप्त किये गये उच्चतम अंकों के आधार पर विनिश्चित किया जायेगा।

11. यदि अभ्यर्थी का हस्तलेखा पढ़ने योग्य नहीं है तो उसके अंकों में कटौती, जो भी विचारणीय होगी, उसके द्वारा अन्यथा प्राप्ताकों में से की जाएगी।

12. केवल अंग्रेजी / हिन्दी विषयों में ही नहीं अपितु समस्त विषयों को परीक्षा में अच्छी अंग्रेजी / हिन्दी का सुव्यवहृत प्रभावशाली कम शब्दों में सटीक अभिव्यक्त करने वालों को श्रेय दिया जाएगा।

13. सभी पेपरों की समय–अवधि 3 घण्टे होगी।

14. वानिकी में 4 वर्षीय डिग्री कोर्स करने वाले वानिकी स्नातकों को लिखित परीक्षा में 5% अंक अधिमान के रूप में दिये जायेंगे।

पाठ्य विवरण.–प्रवेश परीक्षा निम्नलिखित दो अनिवार्य और दो वैकल्पिक पेपर के प्रश्न–पत्रों के रूप में होगी।

अनिवार्य प्रश्न–पत्र

1. **सामान्य ज्ञान.**––सामान्य ज्ञान से सामयिक घटनाओं की जानकारी तथा वैज्ञानिक पहलुओं की दृष्टि से ऐसे दैनिक संप्रेक्षण व अनुभव के विषयों की जानकारी शामिल हैं, जो एक ऐसे शिक्षित व्यक्ति से अपेक्षित है जिसने वैज्ञानिक विषय का विशेष अध्ययन नहीं किया हो प्रश्न–पत्र में भारतीय राजनीति पर भी प्रश्न होंगे, जिसमें राजनीतिक पद्धति, भारत का संविधान, भारत का इतिहास तथा प्रकृति का भूगोल सम्मिलित होंगे, जिन्हें अभ्यर्थी बिना किसी विशेष अध्ययन के उत्तर दने में समर्थ होने चाहिए .....100 अंक।

2. **सामान्य अंग्रेजी** (निबन्ध एवं सार–संक्षेप लेखन इत्यादि)

प्रश्न–पत्र की परिकल्पना अभ्यर्थी की शुद्ध तथा मुहावरेदार अंग्रेजी लिखने की शक्ति की समझ का निर्धारण करना है। इसमें अभ्यर्थी के व्याकरण, मुहावरे तथा वाक्य–प्रयोग सम्बन्धी ज्ञान को परखने के लिए प्रश्न सम्मिलित होंगे। इसके अतिरिक्त प्रादेशिक, राष्ट्रीय या अन्तर्राष्ट्रीय घटनाओं पर आधारित सामयिक विषयों पर एक निबन्ध होगा। निबन्ध 30 अंकों का, सारांश 20 अंकों का तथा अन्य 50 अंकों का होगा ....100 अंक।

3. वैकल्पिक विषय.––कृषि इंजीनियरिंग, रसायन इंजीनियरिंग, सिविल इंजीनियरिंग, कम्पयुटर इंजीनियरिंग, विद्युत इंजीनियरिंग, इलैक्ट्रानिक्स इंजीनियरिंग, यांत्रिक इंजीनियरिंग, पर्यावरण विज्ञान, वानिकी, भू–विज्ञान, उद्यान विज्ञान, गणित, भौतिक विज्ञान, सांख्यिकी, पशु चिकित्सा विज्ञान और प्राणी विज्ञान।

अभ्यर्थियों को उपरोक्त विषयों में से दो विषय चुनने होंगे। वैकल्पिक विषयों में कुल प्रश्नों की सख्या 8 होंगी। प्रत्येक प्रश्न के बराबर अंक होंगे। प्रत्येक प्रश्न पत्र के 2 भाग होंगे अर्थात भाग–I व भाग–II तथा प्रत्येक भाग में 4 प्रश्न होंगे। 8 प्रश्नों में से 5 प्रश्न हल करने होंगे। प्रत्येक भाग में से एक प्रश्न अनिवार्य होगा। शेष 6 प्रश्नों में से प्रत्येक भाग से कम से कम 1 प्रश्न हल करते हुए अभ्यर्थियों को 3 और प्रश्नों के उत्तर देने होंगे इस प्रकार, प्रत्येक भाग से कम से कम 2 प्रश्नों को हल करना होगा अर्थात 1 अनिवार्य प्रश्न तथा एक अन्य प्रश्न ... 200 अंक प्रत्येक विषय में ।

टिप्पण– I इन वैकल्पिक विषयों में परीक्षा का स्तर स्नातक डिग्री स्तर का होगा।

टिप्पण– II किसी भी अभ्यर्थी को ग्रुप (i) कृषि, कृषि इंजीनियरिंग और पशु–चिकित्सा विज्ञान (ii) रसायन और रासायनिक विज्ञान (iii) कम्प्युटर एप्लीकेशन्ज / कम्प्युटर विज्ञान और कम्प्युटर इंजीनियरिंग, (iv) विद्युत इंजीनियरिंग और इलैक्ट्रनिक्स इंजीनियरिंग (v) गणित और सांख्यिकी में से एक से अधिक विषय चुनने की अनुज्ञा नहीं दी जाएगी।

टिप्पणी– III अनिवार्य विषयों में परीक्षा का स्तर 10+2, माध्यमिक या समतुल्य स्तर का होगा।

4 साक्षात्कार एवं चयन.––हिमाचल प्रदेश लोक सेवा आयोग उन अभ्यर्थियों के लिए साक्षात्कार का संचालन करेगा, जो शारीरिक मानक परीक्षण तथा लिखित परीक्षा में योग्यता के आधार पर अर्हता प्राप्त करते हैं अभ्यर्थियों की कुल संख्या जो शारीरिक परीक्षा स्तर आधारित करेंगे उनका साक्षात्कार आयोग द्वारा लिया

जाएगा। अभ्यर्थियों का साक्षात्कार आयोग द्वारा लिया जाएगा, जिनके समक्ष उनका वृत्ति–अभिलेख होगा। साक्षात्कार का उद्देश्य वन परिक्षेत्र अधिकारी (आर0एफ0ओ0) के लिए अभ्यर्थियों की वैयक्तिक उपयुक्तता का निर्धारण करना है। परीक्षण का आशय अभ्यर्थियों के मानसिक व्यास को आंकना है। मोटे तौर पर यह अभ्यर्थियों के न केवल बौद्धिक गुणों, बल्कि उनके सामाजिक लक्षणों तथा सामयिक घटनाओं में रुचि का भी वास्तविक निर्धारण करता है। न्यायनिर्णीत करने के लिए कुछ गुण होंगे अर्थात् मानसिक दक्षता, समीकरण, परिचर्या तथा तर्कसम्मत स्पष्टीकरण की समालोचनात्मक शक्तियां, विवेक बुद्धि का संतुलन, रुचियों के प्रकार तथा गहनता, सामाजिक संलग्नता तथा नेतृत्व की योग्यता, बौद्धिक तथा नैतिक सत्यनिष्ठा . .....75 अंक '';

वन परिक्षेत्र अधिकारी के पद के लिए नियुक्ति हेतु अभ्यर्थियों का चयन हिमाचल प्रदेश लोक सेवा आयोग द्वारा संचालित निम्नलिखित विहित (प्रतियोगिता) परीक्षा के आधार पर किया जायेगा :–
लिखित परीक्षा

1. सामान्य ज्ञान (पर्यावरण परिस्थिति की विज्ञान, ––100 अंक
वन्य प्राणी पर बल)

2. अंग्रेजी (निबन्ध एवं सार–संक्षेप लेखन आदि) ––100 अंक

3. वैकल्पिक पेपर : अभ्यर्थियों को निम्नलिखित में से किन्हीं दो विषयों में परीक्षा देनी होगी (उपरोक्त टिप्पण–II की अध्यधीन) :–

– कृषि,
– वनस्पति विज्ञान
– रसायन विज्ञान
– कम्प्युटर एप्लीकेशन) / कम्प्युटर साईंस
– कृषि इंजीनियरिंग
– रसायनिक इंजीनियरिंग
– सिविल इंजीनियरिंग
– कम्प्युटर इंजीनियरिंग
– विद्युत इंजीनियरिंग
– इलैक्ट्रानिक्स इंजीनियरिंग
– यांत्रिक इंजीनियरिंग
– पर्यावरण विज्ञान
– वानिकी
– भू–विज्ञान
– उद्यान विज्ञान
– गणित
– सांख्यिकी
– भौतिक विज्ञान
– पशु चिकित्सा विज्ञान
– प्राणी विज्ञान''।

AGRICULTURE

PART-I

Ecology and its relevance to man. Natural resources, their management and conservation. Physical and social environment as factors of crop distribution and production. Climatic elements as factors of crop growth, impact of changing environment on cropping pattern,plants as indicators of environments. Environmental pollution and associated hazards to crops, animals and humans.

Cropping patterns in different agro-climatic zones of the country - impact of high yielding and short duration varieties on shifts in cropping patterns. Concepts and principles of multiple cropping - multistorey, relay and inter-cropping and their importance in relation to food production;

Package of practices for production of important cereals, pulses, oilseeds, fibre, sugar and commercial crops grown during Kharif and Rabi seasons in different regions of the country.

Weeds, their characteristics, dissemination and association with various crops; their multiplication; cultural, biological, chemical and integrated control of weeds.

Processes and factors of soil formation, classification of Indian soils including modern concepts, mineral and organic constituents of soil and their role in maintaining soil productivity. Problem soils, extent and distribution in India and their reclamation. Essential plant nutrients and other beneficial elements in soils and plants, their occurrence; factors affecting their distribution, availability functions and recycling in soils; symbiotic and non-symbiotic nitrogen fixation. Principles of soil fertility and its evaluation for judicial fertilizer use.

Watershed management. Soil Conservation planning on watershed basis. Erosion and run of management in hilly, foothills and valley lands - processes and factors affecting them. Dry lands agriculture, its problems and crop production techniques.

Water use efficiency in relation to crop production, criteria for scheduling irrigation, ways and means of reducing runoff losses of irrigation water.

Farm management, scope, importance and characteristics, farm planning and budgeting. Economics of different types of farming systems.

Agriculture extension–its importance and role. Extension techniques, methods of evaluation of extension programs, socio-economic survey and status of big, small and marginal farmers training programs for extension workers. Training and extension programs.

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PART-II

Heredity and variation, Mendel's Law of inheritance, Chromosomal theory of inheritance. Cytoplasmic inheritance, Quantitative characters.

Origin and domestication of field crop. Morphology and patterns of variations in varieties and related species of important field crops. Causes and utilization of variations in crop improvement.

Application of the principles of plant breeding to the improvement of major field crops, methods of breeding of self and cross pollinated crops. Introduction, selection, hybridisation, heterosis and its exploitation. Male sterility and self-incompatibility, utilization of mutation and polyploidy in breeding.

Seed and seed technology, importance, types and seeds and their production, processing and testing of seeds of crops and seed certification regulation.

Climatic requirements and cultivation of major fruits, plants and vegetable crops with special reference to commercial fruits and vegetables, the package of practices and the scientific basis for same.

Handling and Marketing problems of fruits and vegetables, principal methods of preservation of important fruits and vegetable products, processing techniques and equipment. Role of fruits and vegetables in human nutrition, landscape and floriculture, including raising of ornamental plants and design and lay out of lawns and gardens.

Diseases and pests of fields, vegetable, orchard and plantation crops of India and measures to control these. Causes and classification of plant diseases. Principles of plant disease control including exclusion, eradication, immunization and production. Biological control of pests and diseases. Integrated management of pests and diseases. Pesticides and their formulations, plant protection equipment, their care and maintenance.

Growth and Development of Vegetable Crops.—Physiology of dormancy and germination of vegetable seeds and tubers. Tissue culture techniques.

Post-harvest technology.—Maturity and ripping process and factors affecting them. Quality evaluation for fresh market and processing. Factors responsible in deterioration of harvested fruits and vegetables, role of growth substances and irradiation in decay control, respiration and transpiration, storage of fresh fruits and vegetables, theories of chilling injury and symptoms of chilly injured. Modified gas storage.

BOTANY
PART-I

(MICROBIOLOGY, PATHOLOGY, PLANT GROUPS AND THEIR MORPHOLOGY, ANATOMY, TAXANOMY, EMBRYOLOGY OF ANGIOSPERMS)

1. Microbiology - (Viruses and Bacteria). Their structure, classification, reproduction and physiology. Mode of infection of Viruses and Bacteria. Role of microbes in industry and agriculture.

2. Pathology - Knowledge of common and important plant diseases caused by fungi and bacteria (Special reference to diseases common in Himachal Pradesh), mode of infection of fungi and control of disease.

3. Plant Groups - Classification, structure, reproduction, life history and economic importance of Algae, Fungi, Bryophytes Pteridophytes and Gymnosperms (including comparative study of various groups). A general knowledge of distribution of important genera of principal sub-division of above groups in India (Emphasis of Western Himalayas).

4. Morphology, Anatomy, Embryology and Taxonomy of Angiosperms – Morphology and Anatomy of Stem, Root, Leaf (excluding anomalous growth). Tissue and Tissue system. Structure of Anther and Ovule. Fertilization and development of seed. Classification of Angiosperms, Principles of Nomenclature. Modern trends in Taxonomy. A general knowledge of following families of Angiosperms:

Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Rosaceae, Leguminosea, Cucurbitaceae, Umbelliferae, Asteraceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Gramineae.

PART-II

(CELL BIOLOGY, GENETICS AND EVOLUTION, PHYSIOLOGY, ECOLOGY AND ECONOMIC BOTANY)

1. Cell Biology – Cell as a unit of structure and function. Ultrastructure of Cell and its various organelles. Chromosomes – the physical and chemical structure, its behaviour during mitosis and meiosis.

2. Genetics and Evolution – Pre and Post Mandelian concept of Genetics. Development of Gene concept. Genetic code. Nucleic acids, their structure and role in reproduction and protein biosynthesis, Mutations. Role of mutations in plant breeding (wheat, gram, tobacco, cotton only). Organic evolution – evidences and theories.

3. Physiology – Photosynthesis, Absorption and conduction of water, Transpiration, Mineral absorption, Role of elements, Enzymes, Respiration, Fermentation, Growth, Photoperiodism and Vernalisation. Plant Hormones – their type and role. Dormancy of seeds.

4. Plant Ecology – Its scope, plant communities, plant succession, factors. Applied ecology with special reference to pollution and conservation.

5. Economic Botany – Importance of plants, Important plants yielding food, fibre, wood and drugs.

CHEMISTRY

(*Note*:- The student will be expected to solve simple structural, synthetic, mechanistic, conceptual and numerical problems based on and relevant to the syllabus. They are also expected to be acquainted with the S.I. units)

PART-I

***Atomic Structure and Chemical bonding*: –** Quantum theory, Schrodinger equation, particle in a box, hydrogen atom. Hydrogen molecule. Elements of valence bond and molecular orbital theories (idea of bonding, non-bonding and anti-bonding orbitals). Sigma and Pi bonds.

***Chemical Kinetics*: -** Kinetics of reactions involving free radicals, Kinetics of polymerisation and photochemical reactions.

***Surface chemistry and catalysis*:-** Physical absorption, isotherms, surface area determination, heterogenous catalysis, acid bases and enzyme catalysis.

***Electrochemistry*: -** Lomic equilibra; theory of strong electrolytes; Debye, Huckel theory of activity coefficients; electrolytic conduction, galvanic cell, membrane equilibrium and fuel cells. Electrolysis and overvoltage.

***Thermodynamics*: -** Laws of Thermodynamics and application to physiochemical processes systems of variable compositions.

***Electronic structure of transition metal complexes*: -** Crystal field theory and modifications, complexes of Pi-acceptor ligands, organometallic compounds of transition metals.

***Lanthanides Actinides*:-** Separation Chemistry, Oxidation state, magnetic properties. Reaction in nonaqueous solvents.

PART-II

PHYSICAL ORGANIC CHEMISTRY

***Electronic displacements*.—**Inductive, electromeric, mesomeric and hyper-conjugative effects. Electrophiles, nucleophiles and free radicals. Resonance and its application to organic compounds. Effect of structure on the discotiation constants of organic acids and basis. Hydrogen bond and its effects on the properties of organic compounds. Modern concepts of organic reaction mechanisms, addition, substitution, elimination and rearrangement. Reaction involving free radicals. Mechanisms of aromatic substitution. Benzene intermediates.

***Aliphatic Chemistry*.—**Chemistry of simple oganic compounds belonging to the following classes –alkanes, alkynes, alkyl halides, alcohol, thiols, aldehydes, ketones, acids and their derivatives, ethers, amines, amino acids, hydroxy acids, unsaturated acids, dibasic acids.

Synthetic uses of the following.—Acetoacetic and malonic esters, organometallic compounds of magnesium and lithium, ketene, carbene and diazomethane.

***Carbohydrates*.—**Classification and general reactions of simple monosaccharides, hemistry of glucose, fructose and sucrose.

***Stereo Chemistry*.—**Elements of symmetry and simple symmetry operation, Optical and geometrical isomerism in simple organic molecules, E.Z and R.S notations. Conformations of simple organic molecules. Sterecochemistry of inorganic co-ordination compounds.

***Atomic Chemistry*.—**Benzene, toluene and their helegeno, hydroxy, nitro and amino derivatives, Sulphuric acid, Zylenes, Benzaldehyde, Salicylaldehyde, acetophenone, Benzonic, pathalic, salicylic, cinnamic and mandelic acids. Reduction products of nitrobenzene, Diazonium salts and their synthetic uses. Structure, synthesis and important reactions of naphhtalenes anthracene, Phenantherene, Pyridine and quinoline.

***Basic concepts regarding the following materials of economic and medical importance*.—**Cellulose and starch, coal tar, chemicals, organic polymers. Oils and fats, petrochemicals, vitamins, harmones, alkaloids (fermentation products including antibiotics, proteins).

***Organic Photochemistry*.—**Energy level diagrams, quantum yield, Photochemistry of simple organic molecules.

***Polymers*.—**Physical chemistry of Polymers. Molecular weight averages and group analysis, sedimentation light scattering and viscosity of Polymer solutions.

Alloys and inter-metallic compounds.

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COMPUTER APPLICATION/COMPUTER SCIENCE
PART-I

Introduction to Computing.—Number Systems, Binary numbers, Boolean logic, History Computer system, basic machine organization, Von Neumann Architecture, Algorithm definition, design, and implementation, Programming paradigms and Languages, Graphical programming, Overview of Software Engineering and Information Technology, Operating system, Compiler, Computer networks and Internet, Computer graphics, Al, Social and legal issues.

Programming Solving Techniques.—Algorithms and problem solving, development of basic Algorithms, analyzing problem, designing solution, testing designed solution, fundamental programming constructs, translation of algorithms to programmes, data types, control structures, functions, arrays, records, files, testing programmes.

Computer Communications & Networks.—Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues, Network System architecture (OSI, TCP/IP), Error control, Flow Control, Data Link Protocols (HDLC,PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switching and IP Networks, Internetworking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues, Programming exercises or projects involving implementation of protocols at different layers.

Digital Logic & Computer Architecture.—Logic design of Digital Systems, Fundamental and advanced concepts of Logic Designs, Boolean Algebra & functions, Designing and implementation of combinational and Sequential logic, minimization techniques, number representation and basic binary arithmetic Logic families and digital integrated circuits, use of CAD tools for logic designs. Topics of Computer Architecture.

Data Structures & Algorithms.—Basic database concepts; Entity Relationship modeling, Relational data model and algebra, Structured Query Language, RDBMS, Database design, functional dependencies and normal forms, Transaction processing and optimization concepts, concurrency control and recovery techniques, Database recovery techniques, Database security and authorization, Small Group Project implementing a database, Physical database design. Storage and file structure, indexed files, hashed files, signature files, b-trees, files with dense index, file with variable length records, database efficiency and tuning.

Operating Systems.—History and Goals, Evolution of multi-user systems, Process and CPU management, Multithreding, Kernel and User Modes, Protection, Problems of cooperative processes, Synchronization, Deadlocks, Memory management and virtual memory, Relocation, External Fragmentation, Paging and Demand Paging, Secondary storage, Security and Protection, File systems, I/O systems, Introduction to distributed operating systems. Scheduling, dispatch and Introduction to concurrency.

PART-II

Theory of Automata and Formal Languages.

***Finite State Models*.—**Language definitions preliminaries, Regular expressions/Regular languages, Finite automatas (FAs), Transition graphs (TGs),NF As, kleene's theorem, Transducers (automata with output), Pumping lemma and non regular language *Grammars and PDA:* Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs , Normal form grammars and parsing, Push-down Automata, Pumping lemma and non-context free languages, Decidability, Chomsky's hierarchy of grammars, *Turing Machines Theory:* Turing machines, Post machine, Variations on 1M, 1M encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.

Compiler Theory & Design.—Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Comparison between compilers and interpreters.

Numerical Methods.—Mathematical Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Integration, Initial

Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations, Approximation Theory, Eigenvalues and Eigenvector computation.

Data Base Systems.—Basic database concepts, Entity Relationship modelling, Relational data model and algebra, Structured Query language, RDBMS; Database design, functional dependencies and normal forms, Transaction processing and optimization concepts, concurrency control and recovery techniques, Database recovery techniques, Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure, indexed files, hashed files, signature files, b-trees, files with dense index, files with variable length records, database efficiency and tuning Data Warehousing and Data Mining, Emerging Database Technologies and Applications.

Software Engineering.—Software Engineering, Process Models, Software verification and validation. Techniques are introduced to evaluate software correctness, efficiency, performance and reliability, integration of these techniques into a verification and validation plan. Technical reviews, software testing, programme verification, prototyping, and requirement tracing. Attitude of industry toward reliability and performance.

Artificial Intelligence.—Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, meansends analysis. ElIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Searching, Depth first search, breadth first search, best first search, hill climbing, min-max search. Symbolic Mathematics: student solving algebra problems, translating English equations, solving algebraic equations, simplification rules, rewrite rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, hornclause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.

Computer Graphics.—Graphics hardware, Fundamental algorithms, Applications of graphics. Interactive graphics programming -graph plotting, windows and clipping, and segmentation. Programming raster display systems, panning and zooming. Raster algorithms and software Scan-Converting lines, characters and circles. Region filling and clipping. Two and three dimensional imaging geometry and transformations. Curve and surface design, rendering, shading, colour and animation.

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AGRICULTURE ENGINEERING
PART-I

***1. Soil and Water Conservation*.—**Scope of soil and water conservation. Mechanics and types of erosion, their causes. Rainfall, runoff and sedimentation relationships and their measurement. Soil erosion control measures - biological and engineering including stream bank protection - vegetative barriers, contour bunds, contour trenches, contour stone walls, contour ditches, terraces, outlets and grassed waterways. Gully control structures- temporary and permanent; design of permanent soil conservation structures such as chute, drop and ponds. Principles of flood control - flood routing. Watershed Management - investigation, planning and implementation; selection of priority areas and watershed work plan, water harvesting and moisture conservation. Land development - levelling, estimation of earth volumes and costing. Wind erosion process - design of shelter belts and wind brakes and their management. Forest (Conservation) Act.

***Aerial Photography and Remote Sensing*.—**Basic characteristics of photographic images, interpretation keys, equipment for interpretation, imagery interpretation for land use, geology, soil and forestry. Remote sensing – merits and demerits of conventional and remote sensing approaches. Types of satellite images, fundamentals of satellite image interpretation, techniques of visual and digital interpretations for soil, water and land use management. Use of GIS in planning and development of watersheds, forests including forest cover, water resources etc.

2. ***Irrigation and Drainage*.—**Sources of water for irrigation. Planning and design of minor irrigation projects. Techniques of measuring soil moisture - laboratory and *in situ*. Soil water plant relationships. Water requirement of crops; planning conjunctive use of surface and ground water. Measurement of irrigation water, measuring devices - orifices, weirs and flumes. Methods of irrigation - surface, sprinkler and drip, fustigation. Irrigation efficiencies and their estimation. Design and construction of canals, field channels, underground pipelines head gates, diversion boxes and structures for road crossing. Occurrence of ground water, hydraulics of wells, types of wells (tube wells and open wells) and their construction. Well development and testing. Pumps - types, selection and installation. Rehabilitation of sick and failed wells. Drainage - causes of water loggingand salt problem. Methods of drainage - drainage of irrigated and un-irrigated lands, design of surface, sub-surface and vertical drainage systems. Improvement and utilization of poor quality water. Reclamation of saline and alkali soils. Economics of irrigation and drainage systems. Use of wastewater for irrigation – standards of wastewater for sustained irrigation, feasibility and economics.

3. ***Agricultural structure*.—**Site selection, design and construction of farmstead – farm house, cattle shed, dairy bam, poultry shed, hog housing, machinery and implement shed, storage structures for food grains, feed and forage; Design and construction of fences and farm roads. Structures for plant environment - green houses, polyhouses and shade houses. Common building materials used in construction - timber, brick, stone, tiles, concrete etc. and their properties, water supply, drainage and sanitation system.

PART- II

4. ***Farm Power and Machinery*.—**Agricultural mechanisation and its scope. Sources of farm power - animate and electro-mechanical. Thermodynamics, construction and working of internal combustion engines. Fuel, ignition, lubrication, cooling and governing system of IC engines. Different types of tractors and power tillers. Power transmission, ground drive, power take off p.t.o. and control systems. Operation and maintenance of farm machinery for primary and secondary tillage. Traction theory. Sowing, transplanting and interculture implements and tools. Plant protection equipment - spraying and dusting. Harvesting, threshing and combining equipment. Machinery for earth moving and land development - methods and cost estimation. Ergonomics and man-machine system. Machinery for horticulture and agro-forestry, feeds and forages. Haulage of agricultural and forest produce.

5. ***Agro-energy*.—**Energy requirements of agricultural operations and agro-processing. Selection, installation, safety and maintenance of electric motors for agricultural applications. Solan (thermal and photovoltaic), wind and bio-gas energy and their utilisation in agriculture. Gassification of biomass for running IC engines and for electric power generation. Energy efficient cooking stoves and alternate cooking fuels. Distribution of electricity for agricultural and agro-industrial applications.

6. ***Agricultural Process Engineering*.—**Post harvest technology of crops and its scope. Engineering properties of agricultural produces and by-products. Unit operation -cleaning grading, size reduction, densification, concentration drying/ dehydration, evaporation, filtration, freezing

andpackaging of agricultural produces and by-products. Material handling equipment-belt and screw conveyors, bucket elevators, their capacity and power requirement. Processing of Milk and dairy products - homogenisation, cream separation, pasteurisation, sterilization, spray and roller drying, butter making, ice cream, cheese and shrikhand manufacture. Waste and by-product utilization-rice husk, rice bran, sugar can bagasse, plant residues and coir pith.

7. ***Instrumentation and computer applications in agricultural engineering.—*** Electronic devices and their characteristics - rectifiers, amplifiers, oscillators, multi-vibrators, Digital circuits, sequential and combinational system. Application of microprocessors in data acquisition and control of agricultural engineering process-measurement system for level, flow strain, force, torque, power pressure, vacuum and temperature. Computers - introduction, input/ output devices, central processing unit, memory devices, operating systems, processors, keyboards and printers. Algorithms, flowchart specification, programme translation and problem analysis in Agricultural Engineering Multimedia and audio-visual aids.

CHEMICAL ENGINEERING
PART-I

(a) Fluid and Partical Dynamics.—Viscosity of fluids. Laminar and turbulent flows. Equation of continuity and Navier-Stokes equation; Bernoulli's theorem. Flow meters. Fluid drag and pressure drop due to friction, Reynold's Number and friction factor – effect of pipe roughness. Economic pipe diameter. Pumps, water air/steam jet ejectors, compressors, blowers and fans. Agitation and mixing of liquids. Mixing of solid and pastes. Crushing and grinding - principles and equipment. Rittinger' and Bond's laws; Filtration and filtration equipment. Fluid - partical mechanics - free and hindered settling. Fluidization and minimum fluidization velocity, concept of compressible and incompressible flow. Transport of solids.

(b) Mass Transfer.—Molecular diffusion coefficients, first and second law and diffusion, mass transfer coefficients, film and penetration theories of mass transfer. Distillation, simple distillation, relative volatility, fractional distillation, plate and packed columns for distillation. Calculation of theoretical numbers of plates. Liquid-liquid equilibria. Extraction theory and practice; Design of gas absorption columns. Drying, humidification, de-humidification. Crystalisation. Design of equipment.

(c) Heat Transfer.—Conduction, thermal conductivity, extended surface heat transfer. Convection – free and forced. Heat transfer coefficient – Nusselt number. LMTD and effectiveness. NTU methods for the design of Double Pipe and Shell & Tube Heater Exchangers. Analogy between heat and momentum transfer. Boiling and condensation heat transfer, single and multiple-effect evaporators. Radiation: Stefan-BoltzmanLaw, emissivity and absorptivity. Calcuation of heat load of a furnance. Solar heaters.

(d) Noval Separation Processes.—Equilibrium separation processes: ion-exchange, osmosis, electrodialysis, reverse osmosis, ultra-filtration and other membrane processes. Molecular distillation, super critical fluid extraction.

(e) Process Equipment Design.—Factors affecting vessel design criteria-Cost consideration. Design of storage vessels - vertical, horizontal spherical, underground tanks for atmospheric and higher pressure. Design of closures flat and elliptical head. Design of support. Materials of construction – characteristics and selection.

(f) ***Process Dynamic and contro.—***Measuring instruments for process variables like level, pressure flow, temperature PH and concentration with indication in visual/ pneumatic/ analog/

digital signal forms. Control variable, manipulative variable & load variables. Linear control theory - Laplace, transforms, PID controllers, Block diagram representation transient and frequency response, stability of closed loop system. Advanced control strategies. Computer bases process control.

PART-II

***(a) Material and Energy Balance*.—**Material and energy balance calculations in process with recycle/ bypass/purge. Combustion of solid/ liquid/ gaseous fuels, stoichiometric relationships and excess air requirements. Adaiabatic flame temperature.

(b) ***Chemical Engineering thermodynamics*.—**Laws of thermodynamics. PVT relationships for pure components and mixtures. Energy functions and inter-relationships - Maxwell's relations. Fugacity, activity and chemical potential. Vapour-liquid equilibria, for ideal/ non-ideal, single and multicomponent systems. Criteria for chemical reaction equilibrium, equilibrium constant and equilibrium conversions. Thermodynamic cycles – refrigeration and power.

(c) ***Chemical Reaction Engineerin*.—**Batch reactors - kinetics and homogeneous reactions and interpretation of kinetic data. Ideal flow reactors - CSTR, plug flow reactors and their performance equations. Temperature effects & run-away reactions. Heterogeneous reactions - catalytic and non-catalytic & gas-solid & gas –liquid reactions. Intrinics kinetics and global rate concept. Importance of interphase & interparticle mass transfer on performance. Effectiveness factor. Isothermal and non-isothermal reactors and reactor stability.

(d) ***Chemical Technology*.—**Natural organic products -Wood and wood-based chemicals, pulp and paper, Agro-industries-sugar, Edible oils extraction (including tree based seeds), Soaps and detergents. Essential oils - Biomass gassification (including biogas). Coal and coal chemical. Petroleum and Natural gas - petroleum refining (Atmospheric distillation/ cracking/ reforming) - Petrochemical industries – Polythylenes (LDPE/HOPE/ LLDPE), Polyvinyl Chloride, Polystyrene. Ammonia manufacture. Cement and lime industries. Paints and varnishes. Glass and ceramics. Fermentation - alcohol and antiboitics.

(e) ***Environmental Engineering and Safety*.—**Ecology and Environment. Sources of pollutants in air and water. Green house effect, ozone layer depletion, acid rain. Micrometeorology and dispersion of pollutants in environment.Measurement techniques of pollutant levels and their control strategies. Solid waste, their hazards and their disposal techniques. Design and performance analysis of pollution control equipment. Fire and explosion hazards rating-HAZOP and HAZAN. Emergency planning, disaster, management. Environmental legislation's-water air environment protection Acts. Forest (Conservation) Act.

***(f) Process Engineering Economics*.—**Fixed and working capital requirement for a process industry and estimation methods. Cost estimation and comparison of alternatives. Net present value by discounted cash flow. Pay back analysis. IRR, depreciation, taxes and insurance. Break-even point analysis. Project scheduling -PERT and CPM - Profit and loss account, balance sheet and financial statement. Plant location and plant layout including piping.

CIVIL ENGINEERING
PART-I

(A) THEORY AND DESIGN OF STRUCTURES:

(a) ***Theory*.—Principle of superposition, reciprocal theorem, unsymmetrical bending.**

Determinate and indeterminate structures, simple and space frames, degrees of freedom, virtual work, energy theorems, deflection of trusses, redundant frames, three moment equation, scope deflection and moment distribution methods. Column analogy, energy methods, approximate and numerical methods.

Moving loads - Shearing force and bending moment diagrams, influence lines for simple and continuous beams and frames.

Matrix methods of analysis, stiffness and flexibility matrix. Elements of plastic analysis.

Analysis of determinate and indeterminate arches, spandrel braced arch.

(b) Steel Design.—Factors of safety and load factor, design of tension, compression and flexural members built upbeams and plate girders, semi-rigid and rigid connections.

Design of stancheons, slab and gussetted bases, crane and gantry girders, roof trusses, industrial and multi-storeyed building, water tanks.

Plastic design of continuous frames and portals.

(c) ***R.C Design.—***Design of slabs, simple and continuous beams, columns, footings single and combined reft foundations, elevated water tanks, encased beams and columns, ultimate load design. Methods and system of prestressing, anchorages, losses in prestress design of prestressed girders, ultimate load design.

(B) FLUID MECHANICS AND HYDRAULIC ENGINEERING:

Dynamics of fluid equations of continuity, energy and momentum. Barnoullis theorem, cavitation, Velocity potential and stream function, rotational and irrotationan flow, free and forced vortices, flownet.

Dimensional analysis and its application to practical problems.

Viscous flow:- Flow between static and moving parallel plates, flow through circular tubes, film lubrication, velocity distribution in laminar and turbulent flow, boundary layer.

Incompressible flow through pipes:- Laminar and turbulent flow, critical velocity, losses, stamaton diagram. Hydraulic and energy grade lines, siphons pipe not work forces on pipe bends.

Compressible flow:- Adiabatic and isentropic flow subsonic and supersonic velocity, Machnumber, shock waves, water hammer.

Open channel flow:- Uniform and non-uniform flow, best hydraulic cross-section. Specific energy and critical depth gradually varied flow classification of surface profiles, control sections, standing wave flume, surges and wave and waves, hydraulic jump.

Design of canals:- Unlined channel in alluvium, the critical tractive stress, principles of sediment transport regime theories, lined channels, hydraulic design and cost analysis, drainage behind lining.

Canal structures:- Designs of regulation work, cross drainage and communication work – cross regulators, head regulator, canal falls, aqueducts, metering flumes etc., canal outlets.

Diversion Head works:- Principles of design of different parts on impermeable and permeable foundations, Khosla's theory, energy dissipation, sediment analysis.

***Dams*.—**Design of rigid dams, earth dams, forces acting on dams, stability analysis. Design of Spillways, Wells and Tube Wells.

(C) SOIL MECHANICS AND FOUNDATION ENGINEERING:

***Soil Mechanics*.—**Original classification of soil, atterburglimits, void ratio, moisture contents, permeability, laboratory and field tests. Seepage and flow nets, flow under hydraulic structures, uplift and quick sand condition; Unconfined and direct shear tests, triaxial test, earth pressure theories, stability of slopes, theories of soil consolidation, rate of settlement. Total and effective stress analysis, pressure distribution in soils, Boussinasque and Wasterguard theories. Soil stabilization.

Foundation Engineering. Bearing capacity of footings piles and wells; design of retaining walls, sheet piles and caissons.

PART-II

(D) BUILDING CONSTRUCTIONS:

***Building materials and constructions*.—**Timber, stones, brick, sand, surkhi, mortar, concrete, paints and varnishes, plastic, etc.

Detailing of walls, roofs, floors, ceilings, staircases, doors and windows. Finishing of buildings -plastering, pointing, painting etc. Use of building codes, ventilation, air conditioning, lighting and acoustics. Building estimates and specifications, construction scheduling, PERT and CPM methods.

(E) RAILWAYS AND HIGHWAYS ENGINEERING:

(a) ***Railways*.—**Permanent way, ballast, sleeper, chairs and fastenings, points and crossing, differenttypes of turn outs, cross-overs, setting out of points.

Maintenance of track, super elevation, creep of rain, ruling gradients, track resistance, tractive effort, curve resistance.

Station yards and machinery, station buildings, platform sidings, turn tables.

Signal and inter locking, level crossings.

(b) ***Roads and Runways*.—**Classification of roads, planning, geometric design of flexible and rigid pavements, sub-bases and wearing surfaces. Traffic engineering and traffic surveys, intersections road signs, signals and markings.

(F) WATER RESOURCES ENGINEERING:

***Water requirements for crops*.—**Quality of irrigation water, consumptive use of water, water depth and frequency of irrigation, duty of water, irrigation methods and efficiencies.

***Distribution system for canal irrigation*.—**Determination of required channal capacity, channel losses, alignment of main and distributory channels. *Water logging:*- Its causes and control, design of drainage system, soil salinity. *River training*:- Principles and methods.

***Storage works*.—**Types of dams (including earth dams) and their characteristics, principles of design, criteria for stability. Foundation treatment, joints and galleries. Control of seepage.

***Spillways*.—**Different type and their suitability, energy dissipation, spillway crest gates.

(G) SANITATION AND WATER SUPPLY:

***Sanitation*.—**Site and orientation of buildings, ventilation and damp proof course, house drainage, conservancy and water borne system of waste disposal. Sanitary appliances – latrines and urinals. Disposal of sanitary sewage, industrial waste, storm sewage - separate and combined system, flow through sewers, design of sewers, sewer appurtenances, manholes, inlets, junctions, siphon, ejection etc. Sewer treatment working principles, units, chambers, sedimentation tank etc. Activated sludge prepuces, septic tank, disposal of sludge. Rural sanitation, environment pollution and ecology.

***Water supply*.—**Estimation of water resources, ground water hydraulics, predicting demand of water. Impurities of water - physical, chemical and bacteriological analysis. Water borne diseases.

***Intake of water*.—**Pumping and gravity schemes. Water treatment. Principles of settling, coagulation, flocculation and sedimentation. Slow, rapid and preassure filters, softening, removal of taste, odour and salinity.

***Water distribution*.—**Layout storage, hydraulic pipelines, pipe fittings, pumping stations and their operations.

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COMPUTER ENGINEERING
PART-I

Digital Electronics.—Introduction to number System and their conversions. Arithmatic with bases other than ten. Boolean Algebra and Simplification of Boolean expressions. Standard form of boolean functions, Minterm Maxterm designation of functions, Combinational Circuits. Introduction to switching devices, positive and negative logic of OR, AND, NOR, NAND, Exclusive OR, and Exclusive NOR gates, IC digital logic families. implification of function by karrnaugh maps. Quine McCluskey tabular methods for simplification of Boolean function and determination of prime implicants. Selection of an optimal set of prime implicants, multiple output circuits and map minimization of multiple output circuits;. General characteristics of sequential circuits. Clock, puls and level mode sequential circuits. Analysis and design of a sequential circuit.

Programming Languages.—Structured programming and object oriented programming. Abstraction, encapsulation, data hiding, Polymorphism, Scope rules, Parameter passing, run time environment, Static and dynamic storage management, garbage collection, exception handling, task and concurrency in programming language like C, C++. JAVA. Concepts of 4GL

Data Structure And Algorithms.— Elementary and structured data types, Linear Structures: Arrays and Records, Stacks, Queues and Linked Lists, Strings Prefix, Postifix, infix expressions. Non linear structures: generalized linked list, trees, graphs and their traversals, trie and dictionary. Built in Data structures such as Records, Files Sets, Graphs and Pointers. Recurssion, Sorting-Internal and External, Searching, Hashing, Symbol Tables. Problem solving and algorithms development and analysis.

Computer Architecture.—Processor Organization, Instruction fetch and executic cycles, information representation, Number formats and their representation in memory. Common addressing techniques, instruction types, Arithmetic operatiojnns and their implementations. Memories : types, characteristics and organization. System modeling, Design levels. Register level design, Description language, Processor level design, Design Techniques. Instruction Sequencing and interpretation hardwired controls and its implementation concepts, microprogrammed control Conversional and unconversional microprogrammed control computers.

Data Base Management System.—Need, Purpose and Goals of DBMS. Physical and Logical data bases, data abstraction and data independence, data aggregation, data mdels: ER and object Oriented Models, Introduction to relational model, relation algebra, theory of normalization. SQL. Physical data organization in sequential, Indexed, Random and Hashed files. Inverted and multilist structures, B+ Trees. Transaction processing, concurrency control, recovery management and database security, Transaction model properties and state serializability, Lock based protocols. Deadlock prevention and detection. Introduction to Distributed DBMS.

PART-II

System Programming and Operating System.—Concept of machines and assembly language programming, representation of instruction and data, assemblers, and macro assemblers. Introduction to Operating System, Operating System Services and Kernael. Multiprogramming & Time Sharing, Memory management, Paging and Segmenting, Input Output and Device Management, Disk and File management. Deadlocks and concurrent processes. Protection and security, Introduction to multiprocessors and distributed operating systems. Case studies of UNIX and WINDOWS operating systems.

Theory of Computation and Compile Design.—Introduction to Automata Theory, Language, regular expression, finite automata, transition graph, nondeterminism, Push Down Automata Theory, context free grammars, trees, regular grammars, context-free languages. Introduction to compliers, translators and interpreters, compilation process. Lexical and Syntactical analysis. Top Down and Bottom up parsing, syntax directed translation. Symbol tables organizations : Hashing, Linked List, Tree structures. Code generation : Compilation of expressions and control structures. Error detection and recovery. Code optimization : Optimizing transformation, local and global optimization.

Computer Networks.—Data communication Fundamentals, Computer Network, Architecture, Packet and circuit switching. Functions and working of OSI layers. Satellite and packet radio network. Local area network. Internetworking and ISDN/B-ISDN. Network Protocols: Ethernet, TCP/IP. Network management and Interoperability. Performance issues of LAN and WAN.

Software Engineering.—Introduction to Software Engineering, Requirement Engineering, Structural System Design, Data Oriented analysis and Design, Object Oriented Analysis and Design, Software Quality Assurance. User interface design, Software complexity and reliability. Software project management.

Computer Graphics.—Introduction to interactive computer graphics, picture analysis overview of programmer's model of interactive graphics. Fundamental problems in geometry. Basic Raster Graphics: Scan Conversion, filling and clipping. Geometric manipulations : Transformation, Matrices and homogeneous coordinates. Elementary 3-D graphics, plane projections, vanishing points, specification of 3-D view. Visibility, image and object precision, z-buffer algorithms, area based algorithms, floating horizon. Curves and surfaces: parametric representation, Bezer and B-spline curves. Rendering: Ray tracing, antialiasing, Gourard and Phong Shading.

Electrical Engineering
PART-I

1. EM Theory.—Electric and magnetic fields. Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Maxwell's equations. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. ELECTRICAL MATERIALS.—Band Theory, Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3. ELECTRICAL CIRCUITS.—Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Threephase.

4. MEASUREMENTS AND INSTRUMENTATION.—Units and Standards. Error analysis, measurement of current, Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements. Electronic measuring instruments. Digital Voltmeter and frequency counter. Transducers and their applications to the measurement of non-electrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc. Data acquisition systems. A/D and D/A converters.

5. CONTROL SYSTEMS.—Mathematical modeling of physical systems. Block diagrams and signal flow graphs and their reduction. Time domain and frequency domain analysis of linear dynamical system. Errors for different type of inputs and stability criteria for feedback systems. Stability analysis using Routh-Hurwitz array, Nyquist plot and Bode plot. Root locus and Nicols chart and the estimation of gainand phase margin. Basic concepts of compensator design. State variable matrix and its use in system modelling and design. Sampled data system and performance of such a system with the samples in the error channel. Stability of sampled data system. Elements of non-linear control analysis. Control system components, electromechanical, hydraulic, pneumatic components.

6. ELECTRCIAL MACHINES AND POWER TRANSFORMERS.—Magnetic Circuits - Analysis and Design of Power transformers. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation. Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency. B.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Characteristics and performance analysis. Generators and motors. Starting and speed control. Testing, Losses and efficiency. Synchronous Machines. Construction. Circuit model. Operating characteristics and performance analysis. Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation. Hunting. Short circuit transients. Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

PART-II

6. POWER SYSTEMS.—Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines. Modeling and performance characteristics. Voltage control. Load flow studies. Optimal power

system operation. Load frequency control. Symmetrical short circuit analysis. ZBus formulation. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. Equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission.

7. ANALOG AND DIGITAL ELECTRONICS AND CIRCUITS.— Semiconductor device physics, PN junctions and transistors, circuit models and parameters, FET, Zener, tunnel, Schottky, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors. Small signal amplifiers, biasing circuits, frequency response and improvement, ultistage amplifiers and feed-back amplifiers, D.C. amplifiers, Oscillators. Large signal amplifiers, coupling methods, push pull amplifiers, operational amplifiers, wave shaping circuits. Multivibrators and flip-flops and their applications. Digital logic gate families, universal gates-combination circuits for arithmetic and logic operational, sequential logic circuits. Counters, registers, RAM and ROMs.

8. MICROPROCESSORS.—Microprocessor architecture-Instruction set and simple assembly language programming. Interfacing for memory and I/O. Applications of Micro-processors in power system.

9. COMMUNICATION SYSTEMS.—Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

10. POWER ELECTRONICS.—Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. Characteristics and operation. AC to DC Converters; 1- phase and 3-phase DC to DC Converters; AC regulators. Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

Electronics Engineering
PART-I

BASIC ELECTRONICS - MATERIALS AND DEVICES

Materials and Components.—Structure and properties of Electrical Engineering materials, Conductors, Semiconductors and Insulators, magnetic, Ferroelectric, Piezoelectric, Ceramic, Optical and Super-conducting materials. Passive components and characteristics Resistors, Capacitors and Inductors, Ferrites, Quartz crystal, Ceramic resonators, Electromagnetic and Electromechanical components.

Physical Electronics, Electron Devices and ICs.—Electrons and holes in semiconductors, Carrier Statistics, Mechanism of current flow in a semiconductor, Hall effect; Junction theory; Different types of diodes and their characteristics; Bipolar Junction transistor; Field effect transistors; Basics of ICs - bipolar, MOS and CMOS types, basic of Opto-electronics. IC Technologies : Fabrication techniques Basic CMOS VLSI, Full custom VLSI design, Inverter analysis, layout rules, layout of basic gates, circuit extraction, Layout of basic data path.

ELECTRONICS CIRCUITS AND APPLICATIONS

Analog Electronic Circuits.—Transistor biasing, bias stabilization and Small signal and frequency response analysis of transistor circuits. Power amplifiers. Feedback amplifiers, Tuned

amplifiers, Wide-banding techniques. Transistor oscillators. Diode rectifiers, regulators and power supplies. Operational Amplifiers, Phase Locked Loops and other linear integrated circuits with applications. Pulse shaping circuits and waveform generators.

Industrial Electronics.—Thyristor family, principle of operation, commutation circuits Controlled rectifiers, single phase and three phase with different loads. DC choppers : step-up and step-down choppers, chopper circuits, switched mode regulators, effect of source and load inductance. Cyclo-converters: Single and three phase cyclo-converters. Inverter circuits: Single phase bridge inverters, three phase inverters, voltage control of three phase inverter, harmonic reduction. Industrial applications: Induction and dielectric heating, Basic concepts of speed control of DC/AC drives.

SIGNALS AND SYSTEM

Signals and Systems.—Classification of signals and systems: System modeling in terms of differential and difference equations; Electronics Engineering MPSC, Maharashtra Public Service Commission Electronics Engineering Exam http://www maharashtraeducation.net/Civil-Services/mains/ Electronics.asp [16-11-2009 16:11:36]. State variable representation and solution of state of variable equations for continuous and discrete time systems. Fourier series, Fourier transforms, properties and their applications to system analysis.

Laplace transform.—Properties and its application to system analysis. Convolution integral, superposition integral and their applications.

Z-transform.—properties and its applications to the analysis and characterisation of discrete time systems. Discrete time signals and systems, System Classification, stability, DTFT, DFT, FFT algorithms:

Decimation in time and frequency. Linear and circular convolution. Designing of Digital filters - FIR and IIR filters, Butterworth and Chebycheff filters.

Network theory.—Network analysis techniques; Network theorems, transient and sinusoidal steady state response. Network graphs and their applications in network analysis; Tellegen's theorem. Two port networks; Z, Y, h and transmission parameters. Analysis of two port networks, Network functions, parts of network functions, obtaining a network function from a given part.

Transmission criteria: delay and rise time, Elmore's and other definitions, effect of cascading.Elements of one-port and two-port network synthesis.

INSTRUMENTATION AND CONTROL

Electronic Measurements and instrumentation.—Basic concepts, standards and error analysis; Measurements of basic electrical quantities and parameters. Analog and digital electronic measuring instruments, their principles of working their comparison, characteristics and applications.

Transducers.—Electronic measurements of non-electrical quantities like temperature, pressure, humidity. Basics of telemetry for industrial use.

Control Systems.—Transient and steady state analysis of systems. Block diagram reduction and signal flow graphs, Mason's gain formula.Effect of feedback on the performance of systems. Absolute and relative stability of systems.

Frequency response analysis.—Bode diagram, Root Locus, Principle of argument and Nyquist criteria. Constant-M and Constant-N Loci. Nichol's Chart. Stability analysis of continuous time systems with respect to the state space model and Jury's stability criterion for the stability of discrete time systems.

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PART-II

DIGITAL ELECTRONICS AND MICROPROCESSORS :

Transistor as a switching element. Boolean algebra, Number theory. Simplification of Boolean functions, Karnaugh maps and applications. IC Logic gates and their characteristics.

IC logic families.—DTL, TTL, ECL, NMOS, PMOS and CMOS gates and their comparison.

Combinational logic Circuits.—Half adder, Full adder; Digital comparator; Multiplexer, Demultiplexer ; ROM and their applications and Design. Flip flops. R-S, J-K,D and T flip-flops; Different types of counters and registers, Design using flip flops. Waveform generators. A/D and D/A converters. Semi conductor memories. Digital design-POS,SOP minimization, PAL and PLAs, PLDs, FPGA

Sequential machine design.—Mealy and Moore machines, Asynchronous machines-Analysis and design: Races and Hazards. Microprocessors: Architecture and instruction set of Microprocessors 8085 and 8086, Assembly language Programming.

Microprocessor based system design: typical examples, PLCs. Personal computers and their typical uses.

COMMUNICATION SYSTEMS :

Random signals and probability, Correlation functions; Spectral density; Response of linear system to random inputs. Basic information theory. Sampling, quantisation and introduction to coding techniques.

Analog Modulation and demodulation techniques: AM, FM and PM, Radio broadcast transmitters and receivers.

Digital modulation and demodulation techniques, data recovery: integrator, matched filters, correlation receivers and their error probability analysis. Time division and frequency division multiplexing. Equalization.

Telephone networks: Modern telephone exchanges, switching techniques. Elements of Mobile communication. Satellite Communication, Multiple access techniques –FDMA, CDMA.

ELECTROMAGNETICS AND MICROWAVE ENGINEERING

Electromagnetic Theory.—Analysis of electrostatic and magnetostatic fields; Laplace's and Poisson's equations. Boundary value problems and their solutions; Maxwell's equations. Wave propagation through bounded and unbounded media.

Transmission lines.—basic theory, standing waves, stub matching techniques. Microstrip lines. Propagation of signals at HF, VHF, UHF and microwave frequency. Elements of antenna theory.

Microwave Engineering.—Analysis of Microwave Tubes. Solid state microwave devices and their applications. Analysis of waveguides (rectangular and cylindrical). Microwave Components and Circuits. Micro strip circuits. Microwave Measurements. Microwave Antennas.

Optical Communication.—Basics of optical fibre: Numerical aperture, cone of acceptance, rectilinear and curvilinear propagation of light waves through fibre single mode and multi- mode propagation, Optical fibre as a cylindrical wave guide, dispersion and attenuation, splicing techniques, fibre losses, link length calculations, Optical sources and amplifiers, optical detectors, dispersion management in optical fibres. Microwave Communication Systems (terrestrial and Satellite based).

Data structures and computer algorithms.—Electronics Engineering MPSC, Maharashtra Public Service Commission Electronics Engineering Exam Data representation, Programming, Elements of a high level programming language C. Use of data structures such as stacks, queues, linked lists, trees and graphs. Algorithms for insertion and deletion of elements in these data structures. Complexity of algorithms, sorting and searching techniques, Spanning trees, shortest path, Knapsack problem, Traveling sales person's problem, NP-Hard, NP-Complete. Design techniques(Greedy/Dynamic programming/ Divide and conquer).

Computer Organisation.—Fundamentals of computer architecture. Processor design; Control unit design. Memory organisation, I/O System Organisation. Advanced architectures-Parallel processing.

Computer Networks.—ISO/OSI model, packet switching, congestion in communication networks Sliding window protocol. LAN technologies (Ethernet/UDP), TCP, Internet Protocol. Basic concepts of switches, gateways and routers, Internet technologies. Network security.

MECHANICAL ENGINEERING
PART-I

***Statics*.—**Equilibrium in three dimensions. Suspension cables. Principle of virtual work.

***Dynamics*.—**Relative motion, coriolis force, Motion of a rigidbody Gyroscopic motion. Impulse.

***Theory of Machines*.—**Higher and lower pairs, inversions, steering mechanism, Hooks joint, velocity and acceleration of lines, inertia forces. Cams. Conjugate action in gearing and interference, gear trains, epicyclic gear. Clutches, belt drives, brakes, dynamometers, fly wheels, governors, balancing of rotating and reciprocating masses and multicylinder engines. Free, force and damped vibration for a single degree of freedom. Degrees of freedom. Critical speed and whirling of shafts.

***Mechanics of Solids*.—**Strees and strain in two dimensions. Mohr's Circle. Theories of failure, deflection of beams, buckling of columns; combined bending and torsion. Castiglianos theorem. Thick cylinders, rotating disk. Shrink fit. Thermal stress.

***Manufacturing Science*.—**Merchant's theory, Taylor's equation, Machineability. Unconventional machining methods including EDM, ECM and ultrasonic machining. Use of lasers and plasmas. Analysis of forming processes. High velocity forming. Explosive forming. Surface roughness, gauging, compactors, jigs and fixtures.

***Production Management*.—**Work simplification, work sampling, value engineering. Line balancing, work station design, storage space requirement. ABC analysis, Economic order, quantity including finite production rate; Graphical and simplex methods for linear programming; transportation model; elementary queuing theory. Quality control and its uses in product design. Use of X.R.P. and C charts, Single sampling plans, operating characteristics curves. Average sample size, Regression analysis.

PART-II

***Thermodynamics*.—**Applications of the first and second laws of thermodynamics. Detailed analysis of thermodynamic cycles.

***Fluid Mechanics*.—**Continuity, momentum and energy equations. Velocity distribution in laminar and turbulent flow, dimensional analysis. Boundary layer on a flat plate. Adiabatic and isentropic flow, Mach number.

***Heat Transfer*.—**Critical thickness of insulation. Conduction in the presence of heat sources and sinks. Heat transfer from fins. One dimensional unsteady conduction. Time constant for thermocouples, Momentum and energy equations of boundary layers on a flat plate. Dimensionless numbers. Free and forced convection, boiling and condensation. Nature of radiant heat. Stefan Bolzmann law. Configuration factor, logarithmic mean temperature difference. Heat exchanger effectiveness and number of transfer units.

***Energy Conversion*.—**Combustion phenomenon in C.I. and S.I. engines. Carburetion and fuel injection, Selection of pumps, classification of hydraulic turbines, specific speed. Performances of compressors. Analysis of steam and gas turbines. High pressure boilers. Unconventional power systems including Nuclear power and MHD systems. Utilisation of solar energy.

***Environmental Control*.—**Vapour compression, absorption, steam jet and air refrigeration system. Properties and characteristics of important refrigerants. Use of psychometric chart and comfort chart. Estimation of cooling and heating loads. Calculation of supply air state rate. Air conditioning plant layout.

Environmental Science
PART-I

Life Sciences
(Basic Biology and Natural Resources)
Basic Biology

Introduction to biology, branches, scope and importance from environmental point of view. What is life?

The evolution of life on earth: Origin of life - Microbes, Plants and Animals, fossils and sediments, distribution and pattern of life in past, Paleontological evidences, Mass extinction

Life forms on Earth (all forms of plants and animals), Life in Water, Life on Land, Microbial life in

air, water and soils, microbes and diseases, decomposing soil microbes, marine biology.

Taxonomic principles: History, aims, objectives, hierarchy and kingdoms, identification and nomenclature

Classification of plants and animals based on form-relationship, species concept, organization of living things, microbial classification, Ecological Classification Systems, Collection and Herbarium, Preservation, flora, fauna, preservation of insects

Ecological adaptation under various environmental conditions, Hydrophytes, Xerophytes, Halophytes, Mesophytes, Epiphytes

Distribution of life on earth and factors responsible for present day distribution. Continental drift.

Natural Resources

Introduction, scope and importance of natural resources, biotic and abiotic resources Renewable and nonrenewable natural resources and their limitations.

Renewable resources: Forest and wildlife resources, forest wealth of India, animal resources, livestock and fisheries.

Food Resources: World food problems, agricultural resources, agricultural potential of India, effects of modern agriculture

Non-renewable resources: Fossil fuels – coal, oil and natural gas, Consequences of rapid consumption of fossil fuels

Fresh and marine Water resources: global distribution of fresh water and its limits, The sources of fresh water for terrestrial life, fresh water resources of India, mans water requirement, floods and droughts

Soil and Mineral resources: global status, mineral resources of India, metals and minerals Energy resources: Global energy consumption, energy needs, conventional and non-conventional energy sources, alternative energy sources, energy resources of India.

PART-II

Earth Sciences
(Environmental Chemistry and Basic Geosciences)
Environmental Chemistry

Chemistry of atmosphere, Chemical reactions involved in atmosphere, chemistry in ozone depletion, chemical reactions of global warming

Chemistry of water, unusual physical properties, changes in water properties by addition of solute, hydrogen bonding, gases present in water, basic reversible and irreversible reactions in water, sources of cations and anions in water, changes in water properties by addition of solute

Stichiometry, Gibb's energy, chemical potential, chemical equilibria, acid-base reactions, solubility product, carbonate system

Chemistry of carcinogenic compounds and their effects on human body.

Surfactants: Cationic, anionic and non-ionic detergents, modified detergents.

Pesticides: Classification, degradation, analysis, pollution due to pesticides and DDT problems

Lead and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence. Mercury and its compounds: Physical and chemical Properties, behaviour, human exposure, absorption, influence.

Hydrocarbons: Chemistry of hydrocarbon decay, environmental effects, effects on macro and microorganism.

Destruction of some hazardous substances: acid halide, anhydrides, cyanides and cyanogens bromides, chromium, aflotoxins, halogenated compounds.

Basic Geosciences

Atmosphere: Evolution, structure and chemical composition of atmosphere.

Temperature measurement and controls, Environmental lapse rate, dry and wet adiabatic lapse rate, inversion of temperature and atmospheric stability.

Atmospheric pressure and winds, factors affecting on wind, Forms of condensation, precipitation, hydrological cycle.

Internal structure of earth, Geological evolution, plate tectonic, formation of lithosphere. Continental and oceanic crust formation.

Types of rocks, Rock cycle, basic minerals of rock, clay minerals, mineral chemistry.

Soil and its formation, weathering processes, soil profiles, physical and chemical properties of soil, composition of soil. Macro and micro plant nutrients in soil, Soil classification, Soils of India.

FORESTRY
PART—I

1 Silviculture

1.1 General Silvbiculture Principles.—ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation of Forests methods of propagation, grafting techniques site factors nursery and planting techniques nursery beds polybags and maintenance, water budgeting grading and hardening of seedlings special approaches, establishment and tending.

1.2 Silvicultural Systems.—clear felling uniform, shelter wood, selection coppice, and conversion systems, Management of silvicultural system of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to nplantation silvitural choice of species, establishment and management of standards, seeding thining.

1.3 Silviculture of Mangrove and Cold deset.—Managrove habitate and characteristics mangrove, plantation establishment and rehabilitation of degraded mangrove formations, silvitural systems for mangrove, protection of habitats, against natural disasters.

Cold desert- characteristics, identification and management of species.

1.4 Silviculture of trees.—Tradition and recent advances in tropical silvicultural research and practices, Silviculture of some of the economically important species in India such as Acacia catechu, Acacia nitotica, Acacia auriculiformis, Albizzia Albizzia procera Anthocephalus cadamba, anogeissus latifolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea, Casuarina equisetifolia Cedrus deodara, Eucalyptus spp, Gnelina Arborea Hardwickia binata, Iargerstoremia Lanceolata, Pinus rosburghi, Populus SPP, Pterocarpus marsupium, Prosopis juliflora, Santalum album, Semecarpus anacardium, Shorea, robusta, Salmalia malabaricum, Techtonagrandis, Terminlis temimtosa,Tamarindus indica.

2 **Forest Ecology and Ethnobotany.—**Biotic and aboitic components, forest ecosystems, forest community concepts;vegetation concepts, ecological succession and climaxprimary productivity, nutrient cycling and water relation; physiology in stress environments(drought, water togging salinity and alkalinity). Forest types in India, indentification of species, composition and associations; dendrology; taxonomic classification, principles and establishment of herbaria and arporeta, Conservation of forest ecosystems. Clonal parks.

Role of Ethnobotany in Indian Systems of Medicine; Ayurveda and Unani-Introduction, nomenelature, habvitate, distribution and botanical features of medicinal and arnomatic plants, factors affecting action and toxicity of drug plants and their chemical constituents.

3. **Environmental Conservation and bio diversity:**

3.1 Environment: components and importance, principles of conservation, impact of deforestation, forest fires and various human activities like mining, construction and developmental, projects, Population growth on environment.

3.2 Bio diversity: concepts and principles, importance of bio-diversity conservation instuand ex-situ method of conservation, measurement of diversity, diversity indices, Biosphere concept, hotspots of bio-diversity, Indian bio-diversity and gene pool. Conservation efforts in india and worldwide, bio-diversity conventions and treaties.

3.3 **Pollution**- types, global warming, green hose effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring, concept of sustainable development. Role of trees and forests in environmental conservation control and prevention of air water and noise pollution, Environmental Impact Assessment, Economics assessment of watershed development vis-à-vis ecological and environmental protection.

4. Tree improvement, Seed Technology and Biotechnology:

4.1 General concept of tree improvement, methods and techniques, variation and its use provenance, seed source, exotics, quantitiative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement genetic testing programming, selection and breeding, for resistance to diseases, insects, and adverse environment, the genetic base, forest genetic resources and gene conservation in situ and ex-situ Cost benefit ratio economic evaluation.

4.2 **Biotechnology:** Historical developments, scope of biotechnology in agriculture, forestry and industry, Plant tissue culture, response patterns, Application of plant tissue culture in plant improvement, in vitro selection, micro propagation of forest trees and medicinal plants germ plasm conservation and enrichment, recent developments, Gene regulation, genetic engineering techniques, transgenic plants and animals, case studies with special reference to genetic modification of tree species to diseases, pest and other forms of stress. Modication of plant species to practice desired products, Bio-degradation of agriculture and forestry wastes through genetically engineered microbes.

5. Forest Pathology.—Importance and brief history of Forest pathology, terminology concept, causes and classification of plant discases; symptomatology; stages in discase development; dissemination of pathogens; inoculums and inoculums potential; pathogenesisrole of toxins and enzymes; variability in pathogens; disease resistance; plant disease epidemics; disease forecasting; management of disease through regulatory, cultural, physical, chemical and biological methods; integrated disease management; biotechnology in plant pathology Common forest fungi diseases and methods of control. Nursery discases of important tree species.

Principal of Forest disease management Definition and scope of disease management of forestry. Importance of disease cycle and economic threshold in disease management. Principles of disease management such as exclusion, cultural, chemical, dialogical and immumization, Nature of disease resistance. Fungicides and their use in nurseries and plantations. Integration of cultural, chemical, biological and host resistance in effective disease management, Meristem and tissue culture techniques in disease management.

Bio-degration of wood in use. Types of wood decay, gross characters of decay, sap-stain, different types of rots in hardwoods softwoods and their prevention, Graveyard test and decay resistant wood.

6. Forest Entomology: Definition importance and scope of Entomology, Definition of insect and its position in the Animal kingdom. Important characters of phylum arthropoda and class insect. External morphology of generalized insect. Insect growth and development, reproduction in insects immature states (Egg. Larvae/ nymph and pupae), metamorphosis in insects.

Texonomic classification of class insects, diagnostic characters of the orders and major families of economic importance.

History and importance of Forest Entomology in india, methods and principles of pest control; Mechanical, physical, silviculture legal, biological and chemical principles and techniques of in--------pest management in forests.

Classification of forest pests; Types of damages and symptoms; factors for out break of pests, Nature of damage and management; Insect pests of forest seeds, forest nursery and standing trees of timber yielding species of natural forest (ectona, Dalbergia sp. Albiziaspp. Sandal, ailantints, Gmelina, Terminalia, Deodar, Pines); Plantation forest species (Eucalyptus, Bamboo, Casurina, neem, Acacia), Fruit trees, (Emblica, Ver, Eugenia, Tarnarind0 Insect pests of freshly felled trees, finished timbers and their management. Morphology of plant parasitic namatodes, brief classification of important genera of nematodes, important diseases caused by different genera and their management practices.

7. **Wildlife Management and Conservation.—**History of wildlife management and conservation in India; cultural background, Habitate management: purposes, principles, practices and tools-fire, cutting, grazing, Habitat interspersion and edge effect. Provision of water saltlicks and food. Soning core, buffer, tourism and multiple use in protected areas. Wildlife damage control; Mitigating, human wildlife conflict-fences, trenches, walls, lure crops, repellents, translocation and compensation.

Captive wildlife; Zoos and safari parks, Captive breeding for conservation, Role of Central Zoo Authority of India.

Wildlife census; Purpose, techniques, Direct and indirect methods of population estimation, Sample and total counts, indices, encounter rates and densities. Wildlife (Protection) Act, 1972, Protected areas – Sanctury National Partk and Biosphere Reserves, Special projects for Wildlife conservation. Project Tiger and Musk Deer Project. Introduction and reintroduction of species, Wildlife corridors, MAB, Red Date book, Category of threat, CITES, Conservation, meaning, principles and strategies, in-situ and ex-situ conservation, conserving biodiversity, Politics-socio-economic, role of education and extension.

8. FOREST MANAGEMENT

8.1 Forest Management and Management Systems: Objective and principles; techniques; forest management systems – their evolution and application world forestry systems, Forest sources and forestry practices in different regions of the world, international forestry organizations; stand structure and dynamics, sustained yield relation, rotation normal forest growing stock regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches, viz. (1) site-specific planning (ii) strategic planning (iii) Approval, sanction and expenditure (iv) Monitoring (v0 Reporting and governance. Range land management – need and importance. Distribution, characteristics, status and management of range lands, ecology and range lands and impact of grazing, range land inventory mythology -----age equipment techniques, alpine pastures, their importance in nomadic grazing and growth of medicinal shrubs and herbs.

8.2 Forest Working plans: Forest Planning evaluation and monitoring tools and approaches for integrated planning, multipurpose development of forest resources and forest

industries development; working plans and working schemes, their role in nature conservation, bio-diversity and other dimensions; preparation and control. Divisional Working Plans, Annual plan of Operations.

8.3 **Forest mensuration, Inventory and Statistics:** Methods of measuring – diameter girth height and Volume of trees; form –factor; volume estimation of stand, current annual increment; mean annual increment, Sampline methods and sambleplots.

Yield calculation; yield and stand tables, Forest inventory –definition, object, kind of enumeration, Sampling-advantages, kinds of sampling, random sampling simple, stratified, multiphase sampling non-random sampling selective, Systematic and sequential sampling. Sampling design, size and shapes of sampling, units. Point sampling; horizontal and vertical point sampling, forest cover monitoring through remote sensing; Geographic, Information Systems for management and modeling, Forest statistcs- Definition and scope, collection of data and their presentation, measures of central tendency; lawa of probability, linear correlation and its measure, tests of significance, sampling methods and designs, analysis of variance.

8.4 **Surveying and Forest Engineeraing:** Forest surveying – different methods for surveying maps and map reading, Basic principles of forest engineering, Buidling materials and construction , Roads and Bridges; General principles; objects, types, simple design and construction of timber bridges.

9. Forest Protection.—Injuries to forest, abiotic and biotic actors, destructive agencies, insect-pests and disease, effects of air pollution on forests and forest die bck. Susceptibility of forests to damage, nature of damage, cause, prevention, perfective measures and benefits due to chemical and biological control. General forest protection against fire equipment and methods, controlled use of fire, economic and environmental cost; timber salvage operations fter natural disasters, Role of afforestation and forest regeneration in absorption of CO2. Rational and controlled grazing, different methods of control against grazing and browing animals; effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, --- fencing, theft, shifting cultivation and control.

10. Watershed Management and Hydrology.—concepts of watershed: role of mini-forests and forest trees in overall resource management, forest hydrology, water development in respect of torrent control, river channel stabilization, avalanabe and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental fuction of forests; water-harvesting and conservation; ground water recharge and watershed management; role of integrating forest trees, horticulture crops, field crops, grass and fodders, Hydrology, Water resources and Engineering – Hydrological cycle, presipitation, evaporation, transpiration, depression, storage, infiltration, overland flow, hydrograph, flood frequency analysis, flood estimation, flood routing through a reservoir Water logging-its causes and control, design of drainage system, soil salinity, river training- principles and methods.

11. Water science and Technology.—Wood as raw material, kinds of woodhardwood, soft-wood, bamboos and palms, wood as raw material,. The physical features of wood Mechanical properties of wood. Suitability of wood for variousend-uses based on mechanical and physical properties. Electrical and acoustic properties of wood.

Wood water relationship-shrinkage, swelling, movement, fibre saturation, and equilibrium moisture contract, Wood seasoning – merits, principles and types –air seasoning, kiln seasoning, chemical seasoning, Refractory classes of timbers kiln schedules, Seasoning defects and their control. Wood preservation-principles, processes, need, Types of wood preservatives (Water-

soluble, oil based, etc.) classification of timbers based on the----------General idea about fire retardant and their usage.

Non-pressure methods – steeping, dipping, soaking open tank process, Boucherie process, pressure methods – full cell process, emptycell process (Lutory and Ruping) Wood machining.

Sawing- techniques, kinds of sews –cross cut saw, edging saws, cudless saws; handsaw, and circular saw, quarter sawing bow saws, Wood working, tools used in wood working (parting tools, slicing tools, shaping tools, measuring and marking tools, various stages of wood working. Dimensional stabilization of wood by surface coating method bulking method and impregnation of resins and polymers.

12. Computer application in Forestry.—Introcduction to computers–Hardware, software, firware, Components of computer system-Central Processing Unit, Input output devices, Operating system – Batel Processing, Multi-user, Personal computer operation. Computer languages – Machine language, assemble language, high level languages, Compilers and interpreters.

Problem solving on a computer simple algorithms, flowchart marking, BASIC language, constants and variable, Operations- arithmetic, relational and logical operations.

Writing simple programmes in BASIC language to compute the Mean Variance Correlation Regression, work processing and spreadsheets, preoaratuib of forest databases.

13. Remote Sensing and GIS in Forestry: Principle, forest cover mapping through remote sensing, use of remote sensing in forest inventories, GIS fundamentals, GIS in modeling and management of forest resources.

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PART-II

1. Social, Agro and Farm Forestry:

1.1 Social Forestry.—Objective, scope and necessity, evolution of social forestry in India, people participation, experiences of Social Forestry Projects in India.

1.2 Agro – Forestry.—scope and necessary, place of Agro-forestry in National Forest Policy, role in the life of people and domestic animlas and integrated land use, planning especially related to (i) soil and water conservation: (ii) water recharge; (iii) nutrient availability to crops; (iv) pasture and eco-system preservation, including ecological balances through pest-predator relationships and (v) providing opportunities for enhancing biodiversity, medicinal and other flora and fauna, Agro forestry systems under different agro-ecological zones; selection of species and role of multipurpose trees and NTFPs techniques, food, fodder, fodder and fuel security. Research and Extension needs, social forestry in Himachal Pradesh, Van mahotsava and Chipko movement.

1.3 Farm Forestry.—definition, its resemblance and difference from agroforestry, farm wood lots. High-density plantations. Economics of farm forestry; Different farm forestry systems – tagunya, shifting cultivation, alley cropping, wind braks, shelterbelts, dryland and wetland farm forestry.

1.4 Tribology.—tribal scen in India; tribes, concept of rages, principles of social grouping, stages of tribal economy, education, cultural tradition, customs, othes and participation in forestry programmes with special reference to Himachal Pradesh.

2. Joint Forest Management.—Need principles, objectives, methodology, scope, benefits and role of NGOs mahila mandals and other voluntary organizations, details of steps involved such as formation of Village Forest Committees, Joint Forest participatory Management committees.

3. Forest Resources and Utilization.—Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation systems, Storage and sale Non-Timber Forest Products(NTFPs) definition and scope.

Need and importance of wood seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilris Composite wood; adhesibes –manufacture, properties, uses, plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle hoards manufacture properties, uses. Presestatus of composite wood industry in India in future expension plans. Pulp-pager and rayon; present position of supply of raw material to industry, wood substitution, utilization of plantation wood; problems and possibilities.

Anatomical structure of wood, defects and amnormalities of wood timber identification – general principles.

4. Non-Timber Forest Products: Introduction, fodder, grasses and tree leaves, canes and bamboos, and their uses, methods of collection of Non-timber Forest products (NTFPs), Essential Oils, extraction classification. Storage and uses, Non essential oils –nature, occurrence, methods of extraction of oils from seeds, Important oil yielding trees. Gums and Resina- sources, collection and uses, the occurrence and origin of gums in plants, properties of gums, important Indian gums, uses of gums, resins and oleoresins, formation of resins in plants, classification of resins, Tans and Dyes-nature and kinks of tannins, Dyes-classification and sources of dyes, Beedi leaves, sources collection and processing, Fibres and Flosses, Cutch and Katha –sources, extraction and uses, Drups, Spices, poisons and Biopesticids.

5. Marketing and Trade of forest Produce.—Basic concepts of demand, supply of forest produce, demand, demand and supply schedules, types of markets for timber and non-timber forest produce, market iocations of timber and non-timber forest produce and their features,----------forests.

Price determination in timber and non-timber forest produce, Economic feature of specialized markets in terms of degree and type of competition in buying and selling, price spread, costs of marketing functions involved like pre-commercial thinning, commercial thinning, harvesting hauling, sawing, transportation, treatment of wood carpentry, and other processing activities involves in teak-wood, rose wood, match wood, pulpwood, sandalwood, veneers-type and degree of competition in market for services of sawmill and other intermediate wood processing industries, price spreads across different channels of marketing, Economic features of specialized markets in terms of degree and type of competition for bamboo, canes, lacs, gums, resins, hides and skins forest based medicinal plants and trees and trees and other non-timber forest products.

Economics of gathering medicinal plants from forests Economics of processing medicinal plants.

Domestic demand and trade in timber and non-timber forest products.

International demand and trade in timber and non-timber forest product. Market inefficiencces in timber, non-timber forest produce and easires tp cjecl the efcoemcoes/

6. Forest Soils, Soil Conservation.—Forest Soils, classification, factors affecting soil formation; physical; chemical and biological properties, Soil Conservation- definition, causes for erosion; types-wind and water erosion; conservation and management of eroded soil/ areas wind breaks shelter heits sand dunes; reclamation of salins and alkinline soil water logged and other waste lands. Role of Forests as conserving soil organic matter, provision of lopping for green leaf manuring; forest leaf litter and composting; Role of micro- organisms in ameliorating soils N and C cycles, VAM.

7. **Forest Economics.—**Fundamental principles, cost-benefit analysis; estimation of demand and supply; analysis of trends in the national and international market and changes in production and consumption patterns; assessment and projection of market structures; role of private sector and co-operatives; role of corporate financing, Socio-economic analyses of forest productivity and attitudes; valuation of forest goods and service.

8. Forest Policy & legislation.—Policy-definition, necessity and scope Legal and institutional approaches to forest resource management. National Forest Policies, Forest Law, Legal definition Objects of special forest Law Indian Forest Act Detailed study of IFA, 1927. HP State Forest Acts and Rules, History of forest development Indian Forest policy of 1894, 1952 and 1990. National Forest Policy, 1988 of Peiople's involvement, Joint Forest Management, involvement of women; Forestry Policies and issues related to land use timber and non-timber products sustainable forest management; industrialization policies; institutional and structural changes. Decentralization and Forestry Public Administration, Forest laws, necessary, general principles, Indian Forest Act, 1927 (Forest Conservation Act, 1980; Wildlife protection Act, 1972 and their amendments; Application or Indian Penal code to forestry Scope and objectives of Forest inventory. History of Forest Development in India, Forest Policy of 1894, 1952 and amendment of 1980. Forest Law –its necessity Indian Forest Act, 1927; Forest Conservation Act, 1980.

9. Extension & Education.—meaning definition nature; scope objectives; principles approaches and history, Forestry extension; process principles and selected programmes, ICFRE and its institutes; People's participation in forestry programmes; motivation of women community; children youth and voluntary organizations for forestry extension work, Rural Development, meaning , definition, objective and genesis. Transfer of technology programmes like ORP, LLP, ND, FLD, KUK, TARP etc. of ICAE.

10. Communication.—meaning, definition, elements and selected models, Audio visual aids meaning, importance, classification and selection, programme, planning process-meaning scope. Principles and steps, Evaluation meaning, importance and methods. Scope importance of PRA & RRA. Management and administration- meaning, definition, principles and functions. Concepts of human resource development (hRD) rural leadership.

11. Project Planning, monitoring & evaluation.—Needs, scope and types of projects, project methodology, components and cycle, stages of project formulation, projet budgeting, sensitivity analysis, cost benefit ratio and analysis, need for project monitoring and evaluation. M7F techniques and methodology.

GEOLOGY
PART-I

1. Physical Geology and geomorphology.—Origin, structure, interior and age of the Earth Geosynclines and Mountains. Isostasy. Origin of continents and oceans. Continental drift. Seismology, Volcanology, Geological action of surface agencies.

2. Structural and field geology.—Common structure of igneous, sedimentary and metamorphic rocks, study of folds, faults, inconformities, joints and thrusts. Elementary ideas of methods of geological surveying and mapping.

3. Stratigraphy and Palaemology.—Principles of Stratigraphy. Indian Stratigraphy. Lithological and Chronological sub-division of Geological record. Fossils, nature and its mode of preservation, bearing or organic evolution, Invertebrate and plant fossils.

PART-II

1. Crystallography and Mineralogy.—Elements of crystal forms and symmetry. Laws of Crystallography. Crystal systems and classes, Crystal habits. Twinning. Stereographic projections. Physical, chemical and optical properties of minerals, study of more important rock-forming and economic minerals regarding their chemical, physical properties, crystallographic and optical characters; alterations, occurrence and commercial uses.

2. Economic Geology.—Theories of Ore genesis. Classification, geology, occurrence, localities and resources of chief metallic and non-metallic minerals of India, Mineral industries in India. Principles of geophysical prospecting and ore dressing.

3. Petrology.—Origin, constitution, structure and classification of igneous, sedimentary and metamorphic rocks. Study of common Indian rock types.

HORTICULTURE
PART-I

Fruit Industry in India and its potential. General principles of cultivation. Method of propagation.

Physiological basis of rooting. Special plant growing structures – mist propagation, green house and glass house. Promising root stocks for fruit crops. Plant growth regulators, retardants and inhibitors relating to flowering, sex expression, fruit set, fruit development and ripening. Dormancy and rest and rest period.

Pollination and fruit set. Growth and fruiting habits of fruits and nut species. Parthenocarpy. Orchard management practices, manure and manuring, irrigation, training and pruning high density planting. Fruit thinning and fruit drop.

Origin, history, pomological description, climatic requirements and production techniques of important temperate, sub-tropical and tropical fruit crops. Important pests, diseases and physiological disorders and their management. Integrated management of pests and diseases. Harvesting and harvest maturity indices. Handling and marketing problems of major fruits. Special problems of production.

Principal methods of preservation. Important fruit and vegetable products. Processing techniques and equipments. Wastes from processing factory and their impact on environment. By-products and utilization. Nutritive value of fresh and processed fruits and vegetables. Standards of fruit and vegetable products.

Economic principles in fruit and vegetable production. Use of planning and budgeting techniques. Efficiency measures of orchard management.

Extension education and its importance. Methods of evaluation of extension programmes. Socioeconomic survey and status of different categories of farmers. Training programmes for extension workers. Lab to field and T&V programmes.

PART-II

Importance, nutritive value and classification of vegetables. Types of vegetable gardening. Principle of vegetables, cultivation including nursery management. Climatic requirement and cultivation of major summer and winter vegetable crops. Off-season vegetable production. Diseases and pests of vegetable crops and measures to control.

Weeds, their characteristics and association with various vegetable crops.

Principles of plant breeding in the improvement of major vegetable crops. Methods of breeding of self, cross-pollinated and vegetatively propagated crops. Seed technology and its importance. Production, processing, testing and marketing of vegetable seeds.

Plant physiology and its significance. Growth and development factors affecting growth. Absorption and translocation of water transpiration and water economy. Modern concepts of photosynthesis and respiration.

Processes and factors of soil formation. Mineral and organic constituents of soil and their role in maintaining soil productivity. Plant nutrient elements in soils and their availability. Nitrogenous, phosphatic potassic and micronutrient fertilizers and their use. Problem soils and their reclamation. Water conservation and watershed management. Water use efficiency in relation to crop production. Criteria for scheduling irrigation, ways and means of reducing run off losses.

Importance and scope of floriculture, landscaping and interior-scaping. History, theory and principles of landscape, planting and lawns. Beautification of slopes, forests and wastelands. Layout of home gardens and public parks. Propagation of ornamentals. Cultural requirement of ornamental trees, shrubs, climbers, bulbs and annuals for winter and summer season. Production technology and post harvest management of cut flowers, bulbs, house plants and bedding plants.

MATHEMATICS
PART-I

MATHEMETICS PURE

(1) ***Algebra*****.—**Sets, Union, Intersection difference and complementation properties, Venn Diagram. Properties of natural numbers. Real numbers and their representation by decimals. Complex number, Argand Diagram.

Cartesian Product Relation. Mapping. Function as a mapping. Equivalence relation. Groups, Isomorphism or groups. Sub-groups, Normal sub-groups. Legrange's theorem . Frobenius theorem.

The definitions and illustrations of rings and field. Divisors of zero and Homomrohisms. Vector spaces.

Determinants addition, sub-straction, multiplication and inversion of matrix. linear homogeneous and non-homogeneous equations, Cayley Hamilton theorem.

Elementary number of theory. Fundamental theorem of arithmetic. Congruences. Theorems of Format and Wilson. Inequalities. Arithmetical and Geometrical means. Inequalities of Caucuy, Schwz, Holder and Minkowsky.

(2) Infinite sequences and series**.—**Concept of limit infinite series. Convergent, divergent and oscillatory series. Caucuy's general principle of convergence. Comparison and ratio test. Guess's test. Absolute convergence and de-arrangements of series.

(*3) Trigonometry***.—**De Movine's theorem for rational index and tits applications. Inverse, Circular and Hyperbolic functions. Expansions and summation of trigonometrical series. Expressions for sine and cosine in terms of infinite products.

(4) Theory of Equation**.—**General properties of polynomial equation. Transformation of equations.Nature of the roots of cubic and biquadratic, Cardan's solution of the cubic, Resolution of biqadratic into quadratic factors. Location of roots and Newton's method of divisors.

(*5*) ***Analytic Geometry of two and three dimentions.***—Straight lines. Pair of straight lines, Circle, system of circle. Ellips Parabola, Hyperbola, Reduction of second degree equation to a standard form. Plane, straight lines, sphere, cone, concides and their tangent and normal properties (Vector methods will be permissible).

(6) ***Analysis.***—Concept of limit, continuity, derivation, differentiability of a function of one real variable, properties of continuous functions. Characterisation of discontinutes. Mean value theorems. Evaluation of indeterminate forms. Taylor's and Maclrauin's theorems with Laran's and Cauchy's form of remainders. Maxima and minima of function of one variable. Plane curves, singular points, curvature curve tracing. Envelopes, Partial differentiation. Differentiability of function of more than one real variable. Standard methods of integration. Rirman's definition of definite-integral of continuous function. Fundamental theorem of integral culculus. First mean value of theorem of integral culculus. Rectification, quadrature volumes and surfaces of solids of revolution and their applications.

(*7*) ***Differential Equation.***—Formation of ordinary differential equation order and degree. Geometrical demonstration of the existing theorem for sx/sy = S(x,y.). First order linear and nonlinear. equations. Singular points. Singular solutions. Linear differential equations and their important properties. Liners differential equations with constant co-efficients. Cauchy-Euler type of equations. Extcta differential equations and equations admitting integrating factor. Second order equations. Changing of dependent and independent variables, Solution when integral is known variation of parameters.

PART-II
MATHEMATIC APPLIED

(*1*) ***Vector Analysis.***—Vector Algebra , Differentiation of Vector function of a scalar variable. Gradient, Divergence and Curl in Cartesion, cylindrical and spherical co-ordinates and their physical interpretation. Higher order derivatives. Vector identities and Vactor equations. Guess and Stocks theorems.

(*2*) ***Static.***—Fundamental laws of Newtonian Mechanics. Theory of Dimension. Plan Statics. Equilibrium of system of particles. Works and potential energy, Centre of mass and centre of gravity.Frictions, common Catenary, Principle of virtual work. Stability of equilibrium. Equilibrium of forces in three dimensions.

Attraction potential of rods, rectangular and circular discs, spherical shell, sphericel equipotential surfaces and their properties. Properties of potentials. Greens equivalent stratum. Laplacels and Poissons equations.

(3) ***Dynamics.***—Velocity vector, Relative velocity. Acceleration. Angular velocity. Degrees of freedom and constraints. Rectilinear motions; Simple harmonic motion. Motion in a plane. Projectiles. Constrained motion. Work and energy. Motion under impulsive forces. Kepler's laws, Orbits under central forces. Motion of varying mass. Motion under resistance. Moments and products of inertia. Two dimensional motion of a rigid body under finite and impulsive forces. Compound pendulum.

(4) ***Hydrostatics.***—Pressure of heavy fluids. Equilibrium of fluids under given system of forces. Centre of pressure. Thrust on curved surfaces. Equilibrium of floating bodies. Stability of equilibrium. Pressure of gases and problems relating to atmosphere.

PHYSICS
PART—I

***1. Mechanics*.—**Galileans, Transformation, concept of mass and Newton's laws of motion conservation laws, Motion of rigid bodies, Coriolis Forces, Kepler's laws of gravitation, measurement of 'F' of Artificial satellites. Fluid motion, Bernoullis theorem, circulation, Reynold number, turbulence. Viscosity, surface tension, Elasticity, Relativistics mechanic and simple applications, elements of general relativity.

***2. Thermal Physics*.—**Perfect gas, Vander Weals equations. Laws of Thermodynamics. Production and measurement of low temperatures. Kinetic theory of gases; Brownian motion. Black body radiation. Plank's law. Specific heat of gases and solids. Thermionic emission. Fermi Dirac and Bose-Einstein distribution laws. Thermal ionization. Elements of irreversible thermodynamics. Solar energy and its utilisation.

***3. Waves and Oscillations*.—**Oscillations with one and two degrees of freedom, forced vibrations and resonance wave motion. Phase and group velocity.

Huygen's Principle, Reflection, refraction, interference, diffraction and polarization of waves, Optical instruments and resolving power. Multiple beam interference. Ex-M. wave equation, Fresnels formula, normal and anomalous dispersion coherence. Laser and its application.

PART-II

Poisson's and Laplace's equations and simple applications. Dielectric and polarization, capacitors. Dia-para and ferromagnetic materials. Kirchhoffs laws. Amperes law, Faradays laws of electromagnetic induction. L.C.R. circuits, alternating currents, Maxwll's equations.

***Atomic Physics*.—**Bohr's theory, Electron spin, Lande's factor. Paul's principle. Spectre of one electron system. Zeeman effect, wave particle. Elements of X-ray spectra. Compton scattering. Wave particle duality, Schrodinger's equation and simple applications. Uncertainty principles.

Basic properties and structure of nuclei, mass spectrometry, radio activity, mechanism, band and decay, properties of neutron, electron microscope, nuclear fission and reactor, nuclear fusion, cosmic ray showers, pair production. Simple properties of elementary particles. Symmetry in physical laws.

***Electronics*.—**Electron emission from solids, Child-Langmuir Law, Static and dynamic characteristics of diodes, triodes, tetrodes and pentodes; thyraton. Band structure of metals and semiconductors, doped semiconductors; P-N diodes, transistor.

Simple (vacuum tubes and transistor) circuits for Rectification, amplification, oscillation, modulation and detection of r.f. waves. Basic principles of radio reception and transmission. Television. Elementary principles of microscope solid state device.

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STATISTICS
PART-I

(*1*) *Probability*.—Classical and Statistical definitions of probability, Simple theorems of probability with examples. Conditional probability and statistical independence. Bayer's theorem. Random variables – Discreet and continuous. Probability function and probability density

functions. Probability distribution in one or more varieties. Mathematical expectations. Chebyshev's inequality, weak-law of large numbers. Simple form of central limit theorem.

(*2*) ***Statistical methods*.—**Compilation, classification, tabulation and diagrammatic representation of various types of statistical data.

Concepts of statistical population and frequency curve, measures of central tendency and dispersion, moments and cumulants. Measures of Skewness and Kurtosis. Moment-generating functions. Study of standard probability distributions. Binomial, Poison, Hypergeometric, Normal, Negative, Binomial rectangular and log normal distributions. General description of the Pearsenian system of curves.

General properties of a bivariate distributions, bivariate normal distribution. Measures of association and contingency, Correlation and Linear regression involving two or more variables. Correlation ratio. Interclass correlation, Bank correlation. Nonlinear regression analysis.

Curve fitting by methods of free hand curves, moving average's, group average, least squares and movements. Orthogonal polynomials and their uses.

(*3*) ***Sampling distribution and statistical inference*.—**Random sample statistics, concepts of sampling distribution and standard error.

Derivation of sampling distribution of mean of independent normal varieties X2 T and F Statistics, their properties and uses. Derivation of sampling distributions of sample means, variances and correlation coefficient from a vicariate normal population. Derivation (in large samples) and uses Pearsonian X2.

(**4**) ***Theory of Estimation*.—**Requirements of a good estimates/ unbiasedness, consistency, efficiency and sufficiency. Cramer-Rao lower bound to variance of estimates. Best linear unbiased estimates.

Methods of estimation, General descriptions of the methods of moments, Methods of maximum likelihood method, of least squares and method of minimum x2 properties of maximum likelihood estimators (without proof). Theory of confidence intervals, sample problems of setting confidence limits.

PART-II

***Theory of testing of Hypotheses*.—**Simple and composite hypotheses. Statistical test and critical regions. Two kinds of error, level of significance and power of test.

Optimum critical regions of simple hypotheses concerning one parameter. Construction of such regions for simple hypotheses relating to a normal population.

***Likelihood ratio tests*.—**Tests involving mean, variance correlation and regression co-efficient in univariable and bivariate normal population. Simple, non-parametric tests, sign, runmedian, rank and randomisation tests.

Sequential test of a simple hypotheses against a simple alternative (without derivation).

(**I**) ***Sampling techniques*.—**Sampling versus complete enumeration. Principles of sampling. Frames and sampling units. Sampling and non-sampling errors. Simple random

sampling. Stratified sampling. Cluster sampling, Systematic sampling. Description of multi-stage and multiphase sampling. Ratio and regression methods of estimation. Designing of sample surveys with reference to recent large-scale surveysin India.

(II) ***Design of experiments*.—**Analysis of variance and covariance with equal number of observations in the cells.

Transformation of variate to stabilise variance.

Principles of experimental designs. Completely Randomised, randomised block and Latin square design. Missing plot techniques. Factorial experiments with confounding in 2s (s=2(i), 32 and 33 designs. Splitplot design. Balanced incomplete designs and simple lattice.

VETERINARY SCIENCE
PART—I (ANIMAL HUSBANDRY)

1. Animal Nutrition

Energy sources, energy metabolism and requirements for maintenance and production of milk, meat, eggs and work. Evaluation of feed as sources of energy.

1.1 *Advanced studies in Nutrition*.—Protein - sources of protein, metabolism and synthesis, protein quantity and quality in relation to requirements. Energy-protein ratios in a ration.

1.2 *Advanced studies in Nutrition Minerals*.—Sources, functions, requirements and interrelationship of the basic mineral nutrients including trace elements.

1.3 *Vitamins, Hormones and Growth Stimulating substances*.—Sources, functions, requirements and interrelationship with minerals.

1.4 *Advanced Ruminant Nutrition - Dairy Cattle*.—Nutrients and their metabolism with reference to milk production and its composition. Nutrient requirements for calves, heifers, dry and milking cows and buffaloes. Limitations of various feed systems.

1.5 *Advanced Non-Ruminant Nutrition – Poultry*.—Nutrients and their metabolism with reference to poultry, meat and egg production. Nutrient requirements and feed formulation for broilers at different ages.

1.6 *Advanced Non-Ruminant Nutrition - Swine*.—Nutrients and their metabolism with special reference to growth and quality of meat production. Nutrient requirements and feed formulation for baby, growing and finishing pigs.

1.7 *Advanced Applied Animal Nutrition*.—A critical review and evaluation of feed experiments, digestibility and balance studies. Feeding standards and measure of feed energy. Nutrient requirements for growth, maintenance and production. Balanced rations.

2. Animal Physiology

2.1 *Growth and Animal Production*: Pre-natal and post-natal growth, restoration growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

2.2 Milk *production and reproduction and Digestion*.—Current status of hormonal control of mammary development, milk secretion and milk ejection. Composition of milk of cows and Buffaloes. Male and female reproduction organs, their components and functions. Digestive organs and their functions.

2.3 Environmental *Physiology*.—Physiological relations and their regulation mechanisms of adaption, environmental factors and regulatory mechanism involved in animal behavior, methods of controlling climatic stress.

2.4 *Semen quality, Preservation and Artificial Insemination*.—Components of semen, composition of spermatozoa, chemical and physical properties of ejaculated semen, factors affecting semen *in vive* and *in vitre*. Factors affecting semen preservation, composition of dilutents, sperm concentration, transport of diluted semen, deep freezing techniques in cows, sheep and goats, swine and poultry.

3. Livestock production and management.—3.1 *Commercial Dairy Farming*: Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as a specialized farming, economic dairy farming. Starting of a dairy farm, capital and land requirement, organization of the dairy farm, procurement of goods. Opportunities in dairy farming. Factors determining the efficiency of dairy animals. Herd recording, budgeting, cost of milk production, pricing policy, personnel management.

3.2 Feeding *practices of dairy cattle*: Developing practical and economic rations for dairy cattle, supply of greens throughout the year, fields and fodder requirements of dairy farm, feeding regimes for day per young stock and bulls, heifers and breeding animals, new trends in feeding young and adult stock, feeding records.

3.3 General problems of sheep, goat, pigs and poultry management.

3.4 Feeding of animals under drought conditions.

4. Milk Technology

4.1 Organization of rural Milk procurement, collection and transport of raw milk.

4.2 Quality, testing and grading raw milk, quality storage grades of whole milk, skimmed milk and cream.

4.3 Processing, packaging, storing, distributing, marketing defects and their control and nutritive properties of the following milks: Pasteurised, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined, filled and flavoured milks.

4.4 Milk *Product Technology*: Selection of raw materials, assembling production, processing, storing, distributing and marketing milk products such as Butter, Ghee, Khoa, Chhaina, Cheese, condensed evaporated dried milk and baby foods, ice cream and kulfi, bye-products, whey products, butter milk, lactose and casein, testing, grading, judging milk products and agents specifications (ISI and Agmark). Legal standards, quality control, nutritive properties, packaging, processing and operational control. Costs.

4.5 Preparation of cultured milks, cultures and their management. Vitamin-D, soft and other special milks.

4.6 Legal standards, sanitation requirement for clean and safe milk and for the Milk Plant equipment.

PART—II (Veterenery science)

Genetics and Animal Breeding.—Probability applied to Mendelian inheritance. Hardy-Weinberg Law.

Concept and measurement of inbreeding and heretrozygosity - Wright's approach in contrast to Malecost's Estimation of Parameters and Measurements. Fisher's theorem of natural selection, polymorphism, polygenic systems and inheritance of quantitative traits. Casual components of variation. Biometrical models and covariance between relatives. The theory of patheo efficient applied to quantitative genetic analysis. Heritability, repeatability and selection models.

1.1 *Population Genetics applied to Animal Breeding*: Population vs. individual, population size and factors changing it. Gene number and their estimation in farm animals, gene frequency and zygotic frequency and forces changing them, mean and variance approach to equilibrium under different situations. Sub-division of phenotypic variance, estimation of additive, non-additive genetic and environmental variances in Animal population, Mendelism and blending inheritance. Genetic nature of differences between species, races, breeds and other sub-specific grouping and the grouping and the origin of group differences. Resemblance between relatives.

1.2 *Breeding systems*: Heritability, repeatability, genetics and environmental correlation, methods of estimation and the precision of estimates of animal data. Review of biometerical relations between relatives, mating systems, inbreeding, out-breeding and uses. Phenotypic assertive mating. Aids to selections. Family structures of animal. population under non-random-mating systems. Breeding for threshold traits, selection index, its precision, general and specific and combining ability, choice of effective breeding plants.

Different types and methods of selection, their effectiveness and limitations, selection indices, construction of selection in retrospect, evaluation of genetic gains through selection, correlated response in animal experimentation's.

Approach to estimation of general and specific combining ability, Diallete, fractional diallete crosses reciprocal recurrent selection, inbreeding and hybridization.

2. *Health and Hygiene*.—Anatomy of Ox and Fowl. Histological technique, freezing, paraffin embedding etc. Preparation and staining of blood films.

2.1. Common histological stains, embryology of a cow.
2.2. Physiology of blood and its circulation, respiration, excretion, endocrine glands in health and disease.
2.3 General knowledge of pharmacology and therapeutics of drugs.
2.4. Vet-hygiene with respect of water, air and habitation.
2.5. Most common cattle and poultry diseases, their mode of infection, prevention and treatment etc. Immunity. General principles and problems of meat inspection, jurisprudence of Vet. practice.
2.6 Milk Hygiene.

3. Meat Hygiene:
3.1 Zoonosis. Diseases transmitted from animals to man.
3.2 Duties and role of Veterinarians in a slaughter house to provide their meat that is provided under ideal hygienic conditions.
3.3 By-Products from slaughter houses and their economic utilization.

3.4 Methods of collection, preservation and processing of hormonal glands for medicinal use.

4. Extension

4.1 Extension. Different methods adopted to educate farmers under rural conditions.

4.2 Utilization of fallen animals for profit - extension education etc.

4.3 Define Trysem. Different possibilities and methods to provide self-employment to educated youth under rural conditions.

4.4 Crossbreeding as a method of upgrading and local cattle.

ZOOLOGY
PART-I

(NON-CHORDATE AND CHORDATE)

1. A general survey, classification and relationship of various phyla.

2. *Protozoa* - Study of structure, life history of Paramaecium, Vorticella, Monocyotis, Malerial Parasite, Euglena, Trypanosoma.

3. *Porifera* **-** Study of structure of cycon, canal system and skeleton in porifera.

4. *Coelenterata* **–** Obelia, Aurelia (Structure and Life History), polymorphism in Hydrozoa, coral formation, metagenesis.

5. *Helminthes* **-** Planaria, Fasciola, Taenia, Ascaris (Structure and Life History). Parasitism and Parasitic adaptation, Evolution of Parasitism. Helminths in relation to man.

6. *Annelida* **-** Neries, Earthworm, Leech (detailed history)

7. *Arthropoda* - Palaemon, Scorpion, Cockroach, Crustacean Larvae. Economic importance of insects.

8. *Mollusca* - Unio, Pila, Torsion, and detossion in Gastropoda.

9. *Echinodermata* **-** Starfish, larval form of Echinodermata.

10. Structure and bionomics and classification of the following:
Balanoglossus, *Herdmania, Branchiostoma/Scoliodon, Frog, Uromastex, Pigeon, Rabbit***.**

11. Comparative account of the various systems of a vertebrate (Digestive system, Respiratory system, Nervous system, Receptor system, Circulatory system, Urinogenital system.

12. *Retrogressive Metamorphosis, Coclom in Branchiostoma.*

PART-II

(CELL BIOLOGY, CYTOGENETICS, ANIMAL PHYSIOLOGY, EVOLUTION, EMBRYOLOGY AND HISTOLOGY)

1. *Cell Biology* **-** Cell theory, structure and function of cell and cyto-plasmic constituents; structure of Plasma Membrane, Endoplasmic reticulum, Golgi Bodies, Mitochondria, Ribosomes, Nucleus. Cell division **-** Mitosis and Meiosis.Gene structure and Function; Watson and Crick Model of DNA, replication of DNA.

2. *Cytogenetics* **–** Menedlian Laws of inheritance, recombination, multiple alleles, Mutation – natural and induced. Polyploidy. Sex determination, Cytoplasmic inheritance.

3. *Physiology* **–** Chemical composition of protoplasms. Animal Physiology; Digestion and Absorption; Respiration (including Cell Respiration). Kidney and physiology of excretion.

Physiology of nerve's impulse; Physiology of muscular contraction; Physiology of Endrocrine glands, Physiology of osmoregulation.

4. *Evolution* **-** Origin of life, history of evolutionary thought. Evidences of evolution (Anatomical, embryological, comparative physiology evidence for geographical distribution, palaentological evidence).Theoriesof evolution-Lamarckism, Neolamarcism, Darwinism, New Darwinism, Hardy-Weinberg law.

5. *Embryology and Histology* **–** Gametogenesis, fertilization, types of eggs, cleavage, development upto gastrulation in Branchiostoma, Frog and Chick. Fate maps of frog and chick; Metamorphosis in Frog; Formation and fate of extra embryonic membranes in chick; formation of amnion, allentiois, and types of placenta in Mammal.

Histology of the following Tissues and Organs of Mammals:
Epitheliel Tissue, Connective tissue (connective tissue proper, cartilage, bone, blood and lymph). Muscular tissue and nervous tissue.

Histology of skin, stomach, intestine, liver, pancreas, lung, kidney, testis, ovary, spleen.

आदेश द्वारा,
एस0 राय
प्रधान सचिव (वन)।

————————

गृह (जी अनुभाग)

अधिसूचना

शिमला–2, 12 जनवरी, 2011

संख्या गृह(अभि)–ए(3)–1 / 2009.––हिमाचल प्रदेश की राज्यपाल, भारत के संविधान के अनुच्छेद–309 के परन्तुक द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए हिमाचल प्रदेश लोक सेवा आयोग के परामर्श से, हिमाचल प्रदेश अभियोजन विभाग में उप जिला न्यायवादी, वर्ग–I (राजपत्रित) के पद के लिए इस अधिसूचना से संलग्न उपाबन्ध–"क" के अनुसार भर्ती और प्रोन्नति नियम बनाती हैं अर्थात् :–

1. **संक्षिप्त नाम और प्रारम्भ**.––(1) इन नियमों का संक्षिप्त नाम, हिमाचल प्रदेश अभियोजन विभाग उप जिला न्यायवादी, वर्ग–1 (राजपत्रित) भर्ती और प्रोन्नति नियम, 2010 है ।

(2) ये नियम राजपत्र, हिमाचल प्रदेश में प्रकाशित किए जाने की तारीख से प्रवृत्त होंगे ।

2. **निरसन और व्यावृत्तियां**.––(1) इस विभाग की अधिसूचना संख्या एल एल आर बी (1)–2 / 89 तारीख 25–9–1993 द्वारा अधिसूचित तथा 7 मई, 1997 व 19 मार्च, 1999 द्वारा संशोधित अभियोजन विभाग, उप जिला न्यायवादी वर्ग–I (राजपत्रित) भर्ती और प्रोन्नति नियम का एतद्द्वारा निरसन किया जाता है।

(2) ऐसे निरसन के होते हुए भी उपर्युक्त उपनियम (1) के अधीन इस प्रकार निरसित नियमों के अधीन की गई कोई नियुक्ति, बात या कार्रवाही इन नियमों के अधीन विधिमान्य रुप में की गई समझी जाएगी।

आदेश द्वारा,
हसताक्षरित / –
प्रधान सचिव।

उपाबन्ध–"क"

अभियोजन विभाग हिमाचल प्रदेश में उप जिला न्यायवादी, वर्ग–1(राजपत्रित) के पद के लिए भर्ती और प्रोन्नति नियम

1. **पद का नाम.**––उप जिला न्यायवादी

2. **पदों की संख्या.––**37 (सैंतीस)

3. **वर्गीकरण.––**वर्ग–1 (राजपत्रित)

4. **वेतनमान.––**10300–34800 5400 रुपये ग्रेड पे ।

5. **चयन पद अथवा अचयन पद.––**चयन ।

6. **सीधी भर्ती के लिए आयु.––**लागू नहीं ।

7. **सीधे भर्ती किए जाने वाले व्यक्तियों के लिए अपेक्षित न्यूनतम शैक्षिक और अन्य अर्हताएं.––(क) अनिवार्य अर्हर्तता**.––लागू नहीं ।

(ख) वांछनीय अर्हता.––लागू नहीं ।

8. **सीधे भर्ती किए जाने वाले व्यक्तियों के लिए विहित आयु और शैक्षिक अर्हताएं प्रोन्नत व्यक्ति(व्यक्तियों) की दशा में लागू होंगी या नहीं.––आयु**.––लागू नहीं ।

शैक्षिक अर्हता.––लागू नहीं ।

9. **परिवीक्षा की अवधि यदि कोई हो**.––दो वर्ष, जिसका एक वर्ष से अनधिक ऐसी और अवधि के लिए विस्तार किया जा सकेगा, जैसा सक्षम प्राधिकारी विशेष परिस्थितियों में और लिखित कारणों से आदेश दे।

10. **भर्ती की पद्धति––भर्ती सीधी होगी या प्रोन्नति, प्रतिनियुक्ति, स्थानान्तरण द्वारा और विभिन्न पद्धतियों द्वारा भरे जाने वाले पद (पदों) की प्रतिशतता.––**शतप्रतिशत प्रोन्नति द्वारा ।

11. **प्रोन्नति, प्रतिनियुक्ति, स्थानान्तरण की दशा में श्रेणियां, (ग्रेड) जिनसे प्रोन्नति प्रतिनियुक्ति, स्थानान्तरण किया जाएगा.––**सहायक जिला न्यायवादियों में से प्रोन्नति द्वारा, जिनका सात वर्ष का नियमित सेवाकाल या ग्रेड में की गई लगातार तदर्थ सेवाए यदि कोई हो, सम्मिलित करके सात वर्ष का सेवाकाल हो।

परन्तु प्रोन्नति के प्रयोजन के लिए प्रत्येक कर्मचारी को, जनजातीय / दुर्गम क्षेत्रों में पद (पदों) की ऐसे क्षेत्रों में पर्याप्त संख्या की उपलब्धता के अध्यधीन, कम से कम एक कार्यकाल तक सेवा करनी होगीः

परन्तु यह और कि उपर्युक्त परन्तुक (1) उन कर्मचारियों के मामले में लागू नहीं होगा जिनकी अधिवर्षिता के लिए पांच वर्ष या उससे कम की सेवा शेष रही होः

परन्तु यह और भी कि उन अधिकारियों / कर्मचारियों को, जिन्होंने जनजातीय / दुर्गम क्षेत्र में कम से कम एक कार्यकाल तक सेवा नहीं की है, ऐसे क्षेत्र में उसके अपने संवर्ग (काडर) में सर्वथा वरिष्ठता के अनुसार स्थानान्तरण किया जाएगा।

स्पष्टीकरण I.––उपर्युक्त परन्तुक के प्रयोजन के लिए जनजातीय / दुर्गम क्षेत्रों में "कार्यकाल" से साधारणतया तीन वर्ष की अवधि या प्रशासनिक अपेक्षाओं और कर्मचारी द्वारा किए गए कार्य को ध्यान में रखते हुए ऐसे क्षेत्रों में तैनाती की इससे कम अवधि अभिप्रेत होगी ।

स्पष्टीकरण II.––उपर्युक्त परन्तुक के प्रयोजन के लिए जनजातीय / दुर्गम क्षेत्र निम्न प्रकार से होंगे:––

1. जिला लाहौल एवं स्पिति।
2. चम्बा जिला का पांगी और भरमौर उप मण्डल।
3. रोहडू उप मण्डल का डोडरा क्वार क्षेत्र।
4. जिला शिमला की रामपुर तहसील का पन्द्रह बीस परगना, मुनीष, दरकाली और ग्राम पंचायत काशापाट।
5. कुल्लू जिला का पन्द्रह बीस परगना।
6. कांगड़ा जिला के बैजनाथ उप मण्डल का बड़ा भंगाल क्षेत्र।
7. जिला किन्नौर।
8. सिरमौ जिला में उप तहसील कमरउ के काठवाड़ और कोरगा पटवार वृत्त, रेणुकाजी तहसील के भलाड़–भलौना और सांगना पटवार वृत्त और शिलाई तहसील का कोटा पाब पटवार वृत्त।
9. मण्डी जिला में करसागे तहसील का खन्योल–बगड़ा पटवार वृत्त, बाली चौकी उप तहसील के गाडा गोसाईं, मठयानी, घनयाड़, थाची, बागी, सामे गाड़ और खोलानाल, पद्धर तहसील के झारवाड़, कुटगढ़, ग्रामन, देवगढ़, ट्रैला, रोपा, कथोग, सिल्ह–भड़वानी, हस्तपुर, घमरेड़ और भटेढ़ पटवार वृत्त, थुनाग तहसील के चियूणी, कालीपार, मानगढ़, थाच–बगड़ा उत्तरी मगरू और दक्षिणी मगरू पटवार वृत्त और सुन्दरनगर तहसील का बटवाड़ा पटवार वृत्त।

(1) प्रोन्नति के सभी मामलों में पद पर नियमित नियुक्ति से पूर्व सम्भरक (पोषक) पद में की गई लगातार तदर्थ सेवा, यदि कोई हो, प्रोन्नति के लिए इन नियमों में यथाविहित सेवाकाल के लिए, इस शर्त के अधीन रहते हुए गणना में ली जाएगी, कि सम्भरक प्रवर्ग में तदर्थ नियुक्ति / प्रोन्नति भर्ती और प्रोन्नति नियमों के उपबन्धों के अनुसार चयन की उचित स्वीकार्य प्रक्रिया को अपनाने के पश्चात् की गई थी:

परन्तु उन सभी मामलों में जिनमें कोई कनिष्ठ व्यक्ति सम्भरक पद में अपने कुल सेवाकाल (तदर्थ आधार पर की गई तदर्थ सेवा सहित, जो नियमित सेवा / नियुक्ति के अनुसरण में हो) के आधार पर उपर्युक्त निर्दिष्ट उपबन्धों के कारण विचार किए जाने का पात्र हो जाता है, वहां अपने–अपने प्रवर्ग / पद / काडर में उससे वरिष्ठ सभी व्यक्ति विचार किए जाने के पात्र समझे जाएंगे और विचार करते समय कनिष्ठ व्यक्ति से ऊपर रखे जाएंगे:

परन्तु यह और कि उन सभी पदधारियों की, जिन पर प्रोन्नति के लिए विचार किया जाना है, की कम से कम तीन वर्ष की न्यनू तम अर्हता सेवा या पद के भर्ती और प्रोन्नति नियमों में विहित सेवा, जो भी कम हो, होगी:

परन्तु यह और भी कि जहां कोई व्यक्ति पूर्वगामी परन्तकु की अपेक्षाओं के कारण प्रोन्नति किए जाने सम्बन्धी विचार के लिए अपात्र हो जाता है, वहां उससे कनिष्ठ व्यक्ति भी ऐसी प्रोन्नति के विचार के लिए अपात्र समझा जाएगा / समझे जाएंगे।

स्पष्टीकरण.––अंतिम परन्तुक के अन्तर्गत कनिष्ठ पदधारी प्रोन्नति के लिए अपात्र नहीं समझा जाएगा यदि वरिष्ठ अपात्र व्यक्ति भूतपर्व सैनिक है जिसे डिमोबीलाइज्ड आमर्ड फोर्सिज परसोनल (रिजर्वेशन ऑफ वैकेन्सीज इन हिमाचल स्टेट नॉन टैक्नीकल सर्विसीज) रूल्ज, 1972 के नियम–3 के उपबन्धों के अन्तर्गत भर्ती किया गया है और इनके अन्तर्गत वरीयता लाभ दिए गए हों या जिसे एक्स सर्विसमैन (रिजर्वेशन ऑफ वैकेन्सीज इन दी हिमाचल प्रदेश टैक्नीकल सर्विसीज) रूल्ज, 1985 के नियम–3 के उपबन्धों के अन्तर्गत भर्ती किया गया हो और इनके अन्तर्गत वरीयता लाभ दिए गए हों।

(2) इसी प्रकार स्थाईकरण के सभी मामलों मे ऐसे पद पर नियमित नियुक्ति से पूर्व सम्भरक पद पर की गई लगातार तदर्थ सेवा, यदि कोई हो, सेवाकाल के लिए गणना में ली जाएगी, यदि तदर्थ नियुक्ति / प्रोन्नति उचित चयन के पश्चात् और भर्ती और प्रोन्नति नियमों के उपबन्धों के अनुसार की गई थी:

परन्तु की गई उपर्युक्त निर्दिष्ट तदर्थ सेवा को गणना में लेने के पश्चात् जो स्थाईकरण होगा उसके फलस्वरूप पारस्परिक वरीयता अपरिवर्तित रहेगी।

12. यदि विभागीय प्रोन्नति समिति विद्यमान हो तो उसकी संरचना.––जैसी सरकार द्वारा समय–समय पर गठित की जाए ।

13. भर्ती करने में किन परिस्थितियों में हिमाचल प्रदेश लोक सेवा आयोग से परामर्श किया जाएगा.––जैसा विधि द्वारा अपेक्षित हो ।

14. सीधी भर्ती के लिए अनिवार्य अपेक्षा.––लागू नहीं ।

15. सीधी भर्ती द्वारा पद पर नियुक्ति के लिए चयन.––लागू नहीं ।

16. आरक्षण.––सेवा में नियुक्ति एहिमाचल प्रदेश सरकार द्वारा, समय–समय पर अनुसूचित जातियों / अनुसूचित जन–जातियों / अन्य पिछड़े वर्गों और अन्य प्रवर्ग के व्यक्तियों के लिए सेवा में आरक्षण की बावत जारी किए आदेशों के अधीन होगी।

17. विभागीय परीक्षा.––सेवा में प्रत्येक सदस्य को समय–समय पर यथा संशोधित हिमाचल प्रदेश विभागीय परीक्षा नियमए 1997 में यथा विहित विभागीय परीक्षा पास करनी होगी ।

18. फीस का संदाय.––सेवा के किसी भी सदस्य को प्राईवे प्रैक्टिस करने का अधिकार नहीं होगा। फिर भी उन्हें विधि परामर्शी की विशेष अनुज्ञा से, अन्य राज्यों, भारत संघ और हिमाचल प्रदेश सरकार के स्वायत निकायों की ओर से मामलों का अभियोजन, अभिवचन और प्रतिवाद करने की अनुमति दी जा सकेगी और राज्य सरकार द्वारा अन्य राज्यों, भारत संघ और स्वायत निकायों से फीस प्रभारित की जा सकेगी । राज्य सरकार द्वारा अन्य राज्यों, भारत संघ और स्वायत निकायों की ओर से सिविल मामलों के संचालन के लिए प्रभारित उक्त फीस का दो तिहाई सम्बद्ध उप जिला न्यायवादी को संदत्त किया जाएगा ।

19. शिथिल करने की शक्ति.––जहां राज्य सरकार की यह राय हो कि ऐसा करना आवश्यक या समीचीन है, वहां वह, कारणों को लिखित में अभिलिखित करके और हिमाचल प्रदेश लोक सेवा आयोग के परामर्श से आदेश द्वारा, इन नियमों, के किन्हीं उपबन्ध (उपबन्धों) को किसी वर्ग या व्यक्ति (व्यक्तियों) के प्रवर्ग या पद (पदों)की बावत, शिथिल कर सकेगी ।

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[Authoritative English text of this Department's Notification No. Home (Pros.) A(3)-1/2009 Dated 12-1-2011 as required under clause(3) of Article 348 of the Constitution of India].

HOME (G) SECTION

NOTIFICATION

Shimla-2, 12th January, 2011

No. Home(Pros.) A(3)-1/2009.—In exercise of the powers conferred by proviso to Article 309 of the constitution of India, the Governor, Himachal Pradesh, in consultation with the Himachal Pradesh Public Service Commission, is pleased to make the following Recruitment and Promotion Rules for the post of Dy. Distt. Attorney, Class-I (Gazetted) in Department of Prosecution, Himachal Pradesh as per Annexure "A" attached to this notification namely:-

1. Short title and Commencement.—(1) These rules may be called the Himachal Pradesh Prosecution Department, Dy. Distt. Attorney Class-I (Gazetted) Recruitment and Promotion Rules, 2010.

(2) These Rules shall come into force from the date of publication in the Rajpatra, H.P. Repeal and Saving 2. (1) The Recruitment and Promotion Rules for the post of Dy. Distt. Attorney, Class-I (Gazetted) in the Department of Prosecution notified vide this department Notification LLR-B(1)-2/89 dated 25.9.1993 and amended vide Notification of even No dated 7th May,1997 and 19th March,1999 are hereby repealed.

(2) Notwithstanding such repeal any appointments made or any thing done or action taken under the rules so repealed under sub rule(1) supra, shall be deemed to have been validity made, done or taken under these rules.

By order,
Sd/-
Pr.Secretary.

Annexure-"A"

Recruitment and Promotion Rules for the post of Dy. Distt. Attorney, Class-I, (Gazetted) in the Department of Prosecution, Himachal Pradesh

1. Name of the Post.—Deputy Distt. Attorney

2. Number of posts.—37(Ninety Two)

3. Classification.—Class-1(Gazetted)

4. Scale of pay.—(i) Pay Scale for regular incumbents-10300 -34800+5400/-Grade pay

5. Whether "Selection post" or "Nonselection" post.—Selection .

6. Age for direct recruitment.—Not applicable.

7. Minimum educational and other qualifications required for direct recruits.— *(a)Essential Qualification(s)* .—Not applicable.

(b) Desirable Qualification(s) .—Not applicable.

8. Whether age and educational qualification(s) prescribed for direct recruit(s) will apply in the case of the promotee(s) .—*Age.*—Not applicable.

Educational Qualification.—Not applicable

9. Period of probation, if any.— 'Two years' subject to such further extension for a period not exceeding one year as may be ordered by the competent authority in special circumstances and reasons to be recorded in writing.

10. Method(s) of recruitment, whether by direct recruitment or by promotion, deputation, transfer and the percentage of post(s) to be filled in by various methods.—100% by promotion.

11. In case of recruitment by promotion, deputation, transfer, grade from which promotion/deputation/transfer is to be made.—By promotion from amongst the Assistant District Attorneys with seven years regular service or regular combined with continuous adhoc service,if any,in the grade.

Provided that for the purpose of promotion every employee shall have to serve at least one term in the Tribal/Difficult areas subject to adequate number of post(s) available in such areas.

Provided further that the proviso(I) supra shall not be applicable in the case of those employees who have five years or less servicel left for superannuation.

Provided further that Officers/Officials who have not served atleast one tenure in Tribal/Difficult area shall be transferred to such area strictly in accordance with his/her seniority in the respective cadre.

Explanation I.—For the purpose of proviso I supra the "term" in Tribal/Difficult Areas shall mean normally three years or less period of posting in such areas keeping in view the administrative requirements and performance of the employee.

Explanation II.—For the purpose of proviso I supra the Tribal/Difficult Areas shall be as under: -

1. District Lahul & Spiti.
2. Pangi and Bharmour Sub Division of Chamba District.
3. Dodra Kawar Area of Rohru Sub Division.
4. Pandrah Bis Pargana, Munish Darkali and Gram Panchayat Kashapat, Gram Panchayat of Rampur Tehsil of District Shimla.
5. Pandrah Bis Pargana of Kullu District.
6. Bara Bhangal Areas of Baijnath Sub Division of Kangra District.
7. District Kinnaur.
8. Kathwar and Korga Patwar Circles of Kamrau Sub Tehsil, Bhaladh Bhalona and Sangna Patwar Circles of Renukaji Tehsil and Kota Pab Patwar Circle of Shillai Tehsil, in Sirmour District.
9. Khanyol-Bagra Patwar Circle of Karsog, Tehsil, Gada-Gussaini, Mathyani, Ghanyar, Thachi, Baggi, Somgad and Kholanal of Bali-Chowki Sub Tehsil, Jharwar, Kutgarh, Graman, Devgarh, Trailla, Ropa, Kathog, Silh-Badhwani, Hastpur, Ghamrehar and Bhatehar Patwar Circle of Padhar Tehsil, Chiuni, Kalipur, Mangarh, Thach-Bagra, North Magru and South Magru Patwar Circles of Thunag Tehsil and Batwara Patwar Circle of Sunder Nagar Tehsil in Mandi District.

(1) In all cases of promotion, the continuous adhoc service rendered in the feeder post, if any prior to regular appointment to the post shall be taken into account towards the length of service as prescribed in these Rules for promotion subject to the condition that the adboc appointment/promotion in the feeder category ahd been made after following proper acceptable process of selection I accordance with the provisions of R&P Rules,

Provided that in all cases where a junior person becomes eligible for consideration by virtue of this, her total length of service (including the service rendered on adhoc basis , followed by regular service /appointment) in the feeder post in view of the provision referred to above, all persons senior to him/her in the respective category/post /cadre shall be deemed to be eligible for consideration and placed above the junior person in the field of consideration.

Provided that all incumbents to be considered for promotion shall possess the minimum qualifying service of at least three years ' or that prescribed in the R&P Rules for the post. whichever is less.

Provided further that where a person becomes ineligible to be considered for promotion on account of the requirements of the preceding proviso, the person(s) junior to him/her shall also be deemed to be ineligible for consideration for such promotion.

Explanation.—The last proviso shall not render the junior incumbent(s) ineligible for consideration for promotion if the senior ineligible person(s) happened to be Ex- servicemen recruited under the provisions of Rule -3 of the Demobilized Armed Forces Personnel (Reservation of vacancies in Himachal State Non –technical Service)Rules, 1972 and having been given the benefit of seniority there under or recruitment under the provisions of Rule-3 of the Ex-Serviceman (Reservation of vacancies in the Himachal Pradesh Technical Service)Rules,1985 and having been given the benefit of seniority there-under.

(2) Similarly, in all case of confirmations adhoc service rendered on the feeder post, if any, prior to the regular appointment/ promotion against such post shall be taken into account towards the length of service, if the adhoc appointment, promotion had been made after proper selection and in accordance with the provision of the R&P Rules .

Provided that inter-seseniority as a result of confirmation after taking into account, adhoc service rendered as referred to above shall remain unchanged.

12. If a Departmental Promotion Committee exists, what is its composition.—As may be constituted by the Govt. from time to time.

13. Circumstances under which the H.P.P.S.C. is to be consulted in making recruitment.—As required under the Law.

14. Essential requirement for a direct recruitment.—Not applicable

15. Selection for appointment to the post by direct recruitment.—Not applicable

16. Reservation.—The appointment to the service shall be subject to the orders regarding reservation in the service for Scheduled caste/Scheduled Tribe/other backward classes/other categories of person issued by the Himachal Pradesh Government, from time to time.

17. Departmental Examination.—Every member of the service shall pass a Departmental Examination as prescribed in the HP Departmental Examination Rules,1997, as amended from time to time.

18. Paymente of fees.—No member of the service shall have right of private practice. They may,however be allowed with the special permission of the legal Rememberancer to prosecute,plead or defend cases on behalf of other States,Union of India and autonomous Bodies of Himachal Pradesh Government and fee may be charged by the State Government from other states, Union of India and autonomous bodies.The 2/3rd of the said fees charged by the State Government for conducting civil cases on behalf of other States, Union of India and autonomous bodies, shall be paid to Deputy District Attorney concerned.

19. Power to relax.—Where the State Government is of the opinion that it is necessary or expedient to do so,it may,by order for reasons to be recorded in writing and in consultation with the HPPSC relax any of the provision(s) of these Rules with respect to any Class or category of person(s) or post(s).

GENERAL ADMINISTRATION DEPARTMENT
(Confidential & Cabinet)

NOTIFICATION

Shimla-171002, the 2nd February, 2011

No. GAD-C-(A)-(1)-1/2002-II.—The Governor, Himachal Pradesh, is pleased to constitute a Cabinet Sub-Committee as under to consider the matter regarding implementation of the Constitution (85th Amendment) Act, 2001 and assignment of seniority to Government employees belonging to the Scheduled Castes and Scheduled Tribes on promotion by virtue of rule of reservation/roster and to submit its recommendations by 25th February, 2011.:-

1.	Thakur Gulab Singh, Revenue Minister	Chairman
2.	Shri I.D. Dhiman, Education Minister.	Member
3.	Shri Ravinder Singh Ravi, IPH Minister	Member
4.	Shri Kishan Kapoor, Industries Minister.	Member
5.	Shri Jai Ram Thakur, M RD&PR Minister	Member
6.	Shri Mahender Singh Transpsort Minister.	Member
7.	Chief Secretary	Member
8.	Pr. Secretary (Personnel)	Member-Secretary

By order,
Sd/-
Chief Secretary.

आबकारी एवं कराधान विभाग

अधिसूचना

शिमला–2, 1 फरवरी, 2011

संख्या ई0एक्स0एन0–एफ(10)–1 / 2006–II.—हिमाचल प्रदेश मूल्य परिवर्धित कर अधिनियम, 2005 (2005 का अधिनियम संख्यांक 12) से संलग्न अनुसूची "क" के भाग–2 में संशोधन प्रारुप को उपर्युक्त अधिनियम की धारा 10 के अनुसरण में इससे सम्भाव्य प्रभावित होने वाले व्यक्ति(व्यक्तियों) से आक्षेप और सुझाव आमंत्रित करने के लिए, सरकार द्वारा जारी अधिसूचना सं0 ई0एक्स0एन0–एफ(10)–1 / 2006–II तारीख 07 / 01 / 2011 को राजपत्र, हिमाचल प्रदेश में तारीख 10 / 01 / 2011 में प्रकाशित किया गया था ;

और नियत अवधि के भीतर कोई भी आक्षेप / सुझाव प्राप्त नहीं हुआ है ।

अतः हिमाचल प्रदेश की राज्यपाल, हिमाचल प्रदेश मूल्य परिवर्धित कर अधिनियम, 2005 (2005 का अधिनियम संख्यांक 12) की धारा 10 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, उपर्युक्त अधिनियम से संलग्न अनुसूची "क" के भाग–2 में निम्नलिखित संशोधन करती हैं, अर्थात् :–

संशोधन

अनुसूची 'क' के भाग–2 की विद्यमान प्रविष्टि संख्या 5 के पश्चात्, निम्नलिखित नई प्रविष्टि संख्या 6 अन्तःस्थापित की जाएगी, अर्थात् :–

"6. दालें ।"

आदेश द्वारा,
हस्ताक्षरित / –
प्रधान सचिव।

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[Authoritative English Text of this Department Notification No. EXN-F(10)-1/2006-II, dated 01-02-2011 required under Clause (3) of Article 348 of the Constitution of India.]

EXCISE AND TAXATION DEPARTMENT

NOTIFICATION

Shimla-171002, the 1st February, 2011

No. EXN- F(10)-1/2006-II.—Whereas the draft amendment in Part-II of Schedule-A appended to the Himachal Pradesh Value Added Tax Act, 2005 (Act No. 12 of 2005) issued by the government vide notification No. EXN-F(10)-1/2006-II dated 07-01-2011 was published in Rajpatra, Himachal Pradesh on 10-01-2011 in pursuance of the provisions of section 10 of the aforesaid Act for inviting objections and suggestions from the person(s) likely to be affected thereby.

And whereas no objection/suggestion has been received within stipulated period in this behalf.

Now, therefore in exercise of the powers conferred by section 10 of the Himachal Pradesh Value Added Tax Act, 2005 (Act No. 12 of 2005), the Governor, Himachal Pradesh is pleased to make the following amendment in Part-II of Schedule-A appended to the aforesaid Act namely:-

AMENDMENTS

In Part-II of Schedule-'A', after existing entry No. 5, the follwing new entry No. 6 shall be inserted, namely:-

" 6. Pulses."

By order,
Sd/-
Principal Secrretary (E & T).

नियन्त्रक, मुद्रण तथा लेखन सामग्री, हिमाचल प्रदेश, शिमला–5 द्वारा मुद्रित तथा प्रकाशित