

1. THE INSTITUTE

The North Eastern Regional Institute of Science and Technology (NERIST) was set up by the Government of India, initially as a project of the North Eastern Council, for providing a system of education to create technical manpower at various levels for the development of the North Eastern region of the country. NERIST came in to existence as a unique institute of its kind in the country having unconventional and innovative academic programmes. The approach is to encourage a policy for vocationalisation at matriculation level onwards and to allow only motivated students to go for the degree level while others go out of the Institute to enrich their profession with some years of industrial experience. From April 1, 1994, the institute is totally funded and directly controlled by Ministry of Human Resource Development (MHRD), New Delhi. The institute is managed by a Board of Management comprising representatives of the MHRD, Govt. of India, the seven beneficiary states of the North Eastern region, AICTE and eminent educationists.

The foundation stone of the Institute was laid by late Giani Zail Singh, the then President of India, on 4th March, 1984 and the first batch of students was admitted to the Base Module in August, 1986. By July, 2006, sixteen batches of graduates with specialization in Agricultural Engineering, Civil Engineering, Computer Science and Engineering, Electronics and Communication Engineering, Electrical Engineering, Mechanical Engineering and Forestry, have come out. **The institute has been conferred with the “Deemed University” status by UGC on May 31st, 2005 and it started functioning as a Deemed University from December 13th, 2005.**

2. LOCATION

The Institute is located in the picturesque valley at the foothills of the Eastern Himalayas and is situated at Nirjuli in the Papum Pare district of Arunachal Pradesh, on National Highway 52A between Banderdewa (which is the entry point to Arunachal Pradesh and is 10 km from Nirjuli) and Itanagar. It is about 19 km away from Itanagar, the capital complex of Arunachal Pradesh. Arunachal Pradesh is the land of exotic orchids and lush green hills and provides an ideal setting for a seat of technical education with a backdrop of quiet and pristine surrounding.

Located at a distance of 400 km from Guwahati, the Institute can be accessed by rail, road or air. Super Deluxe buses to and from Guwahati are available daily. Taxies can also be hired at Guwahati for coming to the Institute. An overnight train connects Harmuty (the nearest railway station in Assam and is 15 km ahead of NERIST) to Guwahati. Pawan Hans and Jagson Airlines provides helicopter service from Guwahati to Naharlagun (7kms. from the Institute).

3. OBJECTIVES

NERIST aims to achieve the following objectives:

- (i) Developing human resources at three levels, i.e., Technician, Supervisory and Executive level for the development of North Eastern Region in particular and the country in general.
- (ii) Imparting quality education with flexible multi entry/exit systems to cater to the needs of the region.
- (iii) Develop entrepreneurship base in the region.
- (iv) Facilitate competency building in the North Eastern Region.
- (v) Strengthen R & D activities in the region.
- (vi) An advisory role for the overall development of the North Eastern Region.

4. TEACHING DEPARTMENTS

To impart quality education, NERIST has created seven degree awarding departments. The institute offers degrees in six engineering discipline and one in Applied Science (Forestry). The engineering disciplines are Agricultural Engineering, Civil Engineering, Computer Science and Engineering, Electrical Engineering, Electronics and Communication Engineering and Mechanical Engineering. The Applied Science stream offers a degree in Forestry. Two Post graduate programmes in IT (M.Tech.) and MBA are offered by the ECE and HSS departments respectively. The institute is likely to start many PG programmes in near future.

5. THE FACULTY

A highly qualified and motivated faculty from the premier institutes of the country, led by eminent scholars as its Directors, has helped the Institute to grow into a vibrant seat of education catering to all sections of the industry.

The faculty consists of Ph.D.s/Post-Graduates from abroad, IITs, IISc and other leading institutions of the country. The faculty has published very widely in the reputed international/national journals and some of them have received awards for their contribution in research and academics.

A good number of the faculty members are engaged in individual research projects funded by CSIR, DST, MHRD, NEC etc., and quite a few have gone abroad on prestigious fellowships such as BOYSCAST Fellowship, INSA Nehru Centenary Fellowship, SERC Fellowship, etc.

6. ACADEMIC STRUCTURE

The academic programmes in Engineering and Technology stream at NERIST consist of three independent modules, each module consists of two years duration excluding bridge courses. The three modules are called Certificate (Base), Diploma, and Degree modules. Each module has an entry point through an entrance examination conducted by NERIST. The first entry is after class X. Each module also provides terminality corresponding to an occupational level, and at the same time allows entry to the next higher module, leading finally to a degree in engineering and technology in about six years' time after class X. In Applied Science stream, a two year Base Module and a four year Degree module are offered. The system also allows lateral entry from outside with necessary pre-requisites, at the beginning of each module.

The Certificate and Diploma levels emphasize more on the practical aspects of engineering which go a long way in helping an individual become an entrepreneur or to face the day to day problems of industry. The degree curriculum provides instructions not only in engineering, but emphasizes on management and entrepreneurship aspects as well, making an individuals more suited for today's industries.

7. CENTRAL FACILITIES

7.1. ADVANCED CENTRAL COMPUTING FACILITY (ACCF)

ACCF was established in 1996 with the objectives of promoting research by faculty members and encouraging advanced computer studies by interested students. Today ACCF plays a key role in the field of computer education not only at the Institute but outside the campus too.

7.2. EDUCATIONAL TECHNOLOGY CELL

The cell has been established as a project sponsored by MHRD, with an objective to increase the effectiveness of teaching-learning process with the help of the modern audio-visual equipments. Now the cell consists of a processing laboratory and a seminar room which is well equipped with state of the art audio visual equipments. These equipments are used for Seminars, Conferences, Workshops and special lectures by faculty members and professionals from institutions and industries.

7.3. INTERNET & E-MAIL SECTION:

The Institute is well connected to INTERNET through a permanent VSAT. It provides Internet and e-mail services to all the members.

7.4. INSTITUTE LIBRARY

The Central library, with a collection of 42,000 books, subscribes 49 international and 145 national journals. It also subscribes 10 magazines and 12 national and regional dailies to provide a base for enhanced learning. Library, a member of indest consortia, offers access to 9 international journals to its members. It possesses IS code on CD-ROM and also has a student chapter of IEEE. NERIST is also an institutional member of Indian Liquid Crystal Society, Bangalore and Kaziranga Wild Life Society of Assam to provide literature and information services.

7.5. CAMPUS AMENITIES

The Institute has a sub Post Office, a branch of State Bank of India, a Co-operative store, Nescafe Coffee Corner, a Medical Aid Centre, a Police out-post, a Kendriya Vidyalaya and a Kinder Garten School for Children. There are also clubs for the ladies, staff, faculty and officers of NERIST in the campus. There is also a canteen for students and staff. The Institute houses a telephone exchange on the campus and has its own EPABX of 600 lines.

7.6. THE STUDENTS

NERIST currently has strength of over 1000 students. The institute is fully residential and to accommodate these students, NERIST has eight hostel blocks which include four double storeyed and four single storeyed hostels. Amongst the four double storeyed hostels, one is exclusively for girls.

7.7. STUDENT GYMKHANA

Students' Gymkhana is the center of co-curricular activities of the students of NERIST. It provides the students with the facilities for their all round development in the field of sports, culture, hobbies and creativity.

7.8. TRAINING AND PLACEMENT

Right from its inception in 1991, the Training & Placement Cell has been functioning actively in providing Training, Placement and Career development opportunities to the students and also rendering valuable services in counselling the students on continuous basis. Besides the above, the cell now extends its activities in the following areas:

- Industry-Institute Interaction activities
- Public Awareness and Relations
- Entrepreneurship Development Programme
- Student's Career Counselling
- Short Term Courses/Workshop to prepare students for various Interviews

The cell also organises industrial training or field training for a period of 50 days at the end of the pre-final year during summer vacation, which is a compulsory requirement in partial fulfillment of the curriculum. Some of the organisations where NERIST students go for their training are:-

BHEL, BEL, BRPL, C-DOT, CEERI, CMC, ESCORTS, HAL, HCL-HP, HIND MOTORS, HPC, IDPL, INDIAN AIRLINES, IOC, ISRO, IITL, L&T, METRO RAILWAYS, NBCC, NEEPCO, NIC, NSTL, OIL, ONGC, PRAGA TOOLS, SAIL, SIEMENS, TATA UNIYSIS, TATA MOTORS, ERDL, DRDL, ADA, NALCO, GAMMON INDIA.

The training and placement cell also guides and helps the final year students in securing jobs commensurate with their knowledge and other achievements, by organising campus interviews and exploring various avenues for their placement.

The cell also organises regular workshops for pre-final and final year students. The basic objective of these workshops is to provide sufficient exposure to the students in the areas related to recruitment, selection and personality development, to facilitate

their entry into leading and highly professional organisations. Such workshops provide information and guidance for preparing bio-data and better communication skills. It also provides necessary guidance for participating in group discussion and interview facing skills.

All facilities are provided to the officials conducting campus interviews on NERIST campus. Arrangements are also made for conducting interviews at Guwahati on weekends and holidays. The organisations which recently came to conduct campus interviews include: CMC, EIL, GAIL, HCL-HP, Hindustan Papers Corporation, Indian Army, IOC, OIL, Siemens Software, Powergrid, Tata-Telecom, Wipro Infotech, TERI, PRADAN, CAPART, etc.

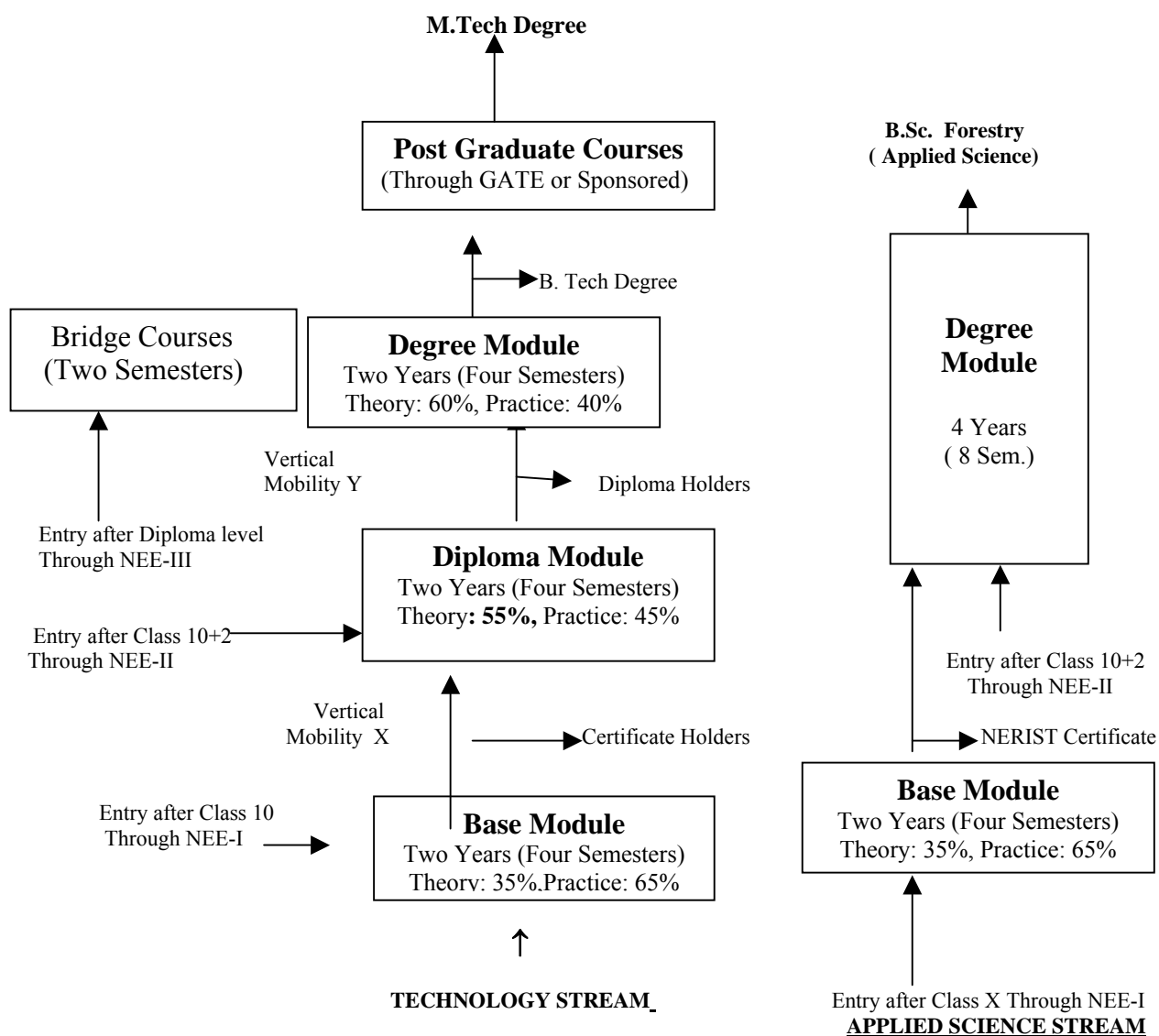
NERIST students are serving in prestigious industries/organisations such as:

ABB (Asia Brown Boveri); AT&T Bells Laboratory; Texas Instruments, Ericsson (USA); CDC; C-DOT; CMC Ltd.; Crompton Greaves; Fujitsu Network Switching of America, Inc.; HCL-HP Ltd.; Hero Cycles; Hewlett-Packard (Hong Kong) Ltd.; Hindustan cables; Hindustan Paper Corporation; Indian Railways (Through Indian Engineering Services); Modi Olivetti; Motorola (India) Electronics Pvt. Ltd.; National Informatics Centre; NIIT; Oil India Ltd.; PCL; Philips India; Reliance Industries; Shipping Corporation of India Ltd.; Siemens; Steel Authority of India Ltd.; Tata Telecom; TCS; Videocon; TCS; Videocon; Wipro Ltd. Infosys; Ashok Leyland; Gammon India; Crompton Greaves; Mind Tree; Mahindra British Telecom; L & T; Indian Navy & Indian Air Force; Power Grid Corporation of India etc.

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8. NERIST ADMISSION PROCEDURE :

The NERIST Entrance Examination (NEE) is conducted for admission to certificate, Diploma and Degree programmes. Three different examinations known as NEE-I, NEE-II and NEE-III are held to take admission at three different levels. NERIST Entrance Examinations are conducted in various Centres located in the North Eastern States of India. The selection of students is done in order of merit. The notification for NEE-I, II & III is done in Regional & National news papers.



Qualifying percentage of total seats according to:-

X : Vertical Mobility based on **CGPA 3.00/5.00**

Y : Vertical Mobility based on **CGPA 3.25/5.00**

9. NERIST ENTRANCE EXAMINATION-2007

The NERIST Entrance Examination (NEE) is conducted for admission to certificate, Diploma and Degree programmes. Three different examinations known as NEE-I, NEE-II and NEE-III are held to take admission at three different levels.

NERIST Entrance Examinations are conducted in various Centres located in the North Eastern States of India.

9.1. NEE-I consisting of one paper of 150 marks and three hours duration will be conducted at various centres located in the eight states of North East. **All questions will be of objective type with multiple choice answers. For every wrong answer to a question 25% ($\frac{1}{4}^{\text{th}}$) of the marks carried by the question will be deducted from the aggregate marks obtained by the candidate.**

Scheme for NEE-I

The question paper shall consist of four sections. The subjects and distribution of marks shall be as given below:

Section A (Physics): 25 marks, 25 questions of 1 mark each
Section B (Chemistry): 25 marks, 25 questions of 1 mark each
Section C (Biology): 25 marks, 25 questions of 1 mark each

Section D (Mathematics):
75 marks: { 25 questions of 1 mark each,
25 questions of 2 marks each.

ELIGIBILITY:

(i) **Maximum Age Limit:** 19 years (24 years for SC/ST/PH and 22 years for OBC and female candidates) as on **1st August, 2007**

(ii) **Qualification:** Should have passed matric or Class-X examination of 10+2 system or an equivalent examination with Science and Mathematics. The candidate should have passed in Science and Mathematics respectively. Candidates appearing in the above mentioned examination, but whose results

are awaited may also appear in the NERIST Entrance Examination. A certificate to this effect is to be obtained from the Principal of the school and must be attached with the application. In case, such a candidate is selected, he/she must produce the original pass certificate and marks sheet at the time of his/her admission. Otherwise, his/her admission will automatically get cancelled. A candidate registered in NERIST Base Module cannot be allowed to appear in the NEE-I.

9.2. NEE-II consisting of one paper of 150 marks and three hours duration, will be conducted at various centres located in the eight states of North-East. **All questions will be of objective type with multiple choice answers. For every wrong answer to a question 25% ($\frac{1}{4}^{\text{th}}$) of the marks carried by the question will be deducted from the aggregate marks obtained by the candidate.**

Scheme for NEE-II

There shall be three different question papers for the two streams (i) 10+2 PCM/PCB/PCMB, (ii) 10+2 Vocational (Technology) and (iii) 10+2 Vocational (Forestry).

(i) Pattern of question paper for 10+2 PCM/PCB/PCMB candidates seeking admission to Diploma Module in Engineering/Technology or Degree Module in Forestry:

The question paper shall consist of four sections viz. Sections A, B, C and D.

Section A, B and C shall have to be attempted by all candidates seeking admission to technology stream.

Section A, B and D shall have to be attempted by all candidates seeking admission to forestry stream.

The subjects and distribution of marks shall be as given below:

Section A (Physics):
45 marks: { 25 questions of 1 mark each
10 questions of 2 marks each

Section B (Chemistry):
45marks { 25 questions of 1 mark each
10 questions of 2 marks each

Section C (Mathematics):
60 marks { 30 questions of 1 mark each
15 questions of 2 marks each

Section D (Biology):
60 marks : { 30 questions of 1 mark each
15 questions of 2 marks each

(ii) Pattern of question paper for 10+2 Vocational candidates seeking admission to Diploma Module in Engineering/Technology:

The question paper shall consist of two sections, viz., Section A and Section-B. Section A will consist of three sub sections: A-1, A-2 and A-3 and the questions will be common for all the trades/vocations.

The subjects and distribution of marks shall be as given below:

A-1 (Physics):
20 marks { 10 questions of 1 mark each
5 questions of 2 marks each

A-2 (Chemistry):
20 marks { 10 questions of 1 mark each
5 questions of 2 marks each

A-3 (Mathematics):
30 marks { 10 questions of 1 mark each
10 questions of 2 marks each

Section B will consist of two sub sections:

B-1 and

B-2.

Questions of sub section B-1 will be common for all vocations/trades. Questions of sub-section B-2 will pertain to the relevant vocation/trade. The subjects and distribution of marks shall be as given below:

B1: Common Engineering Sciences:
30 marks: { 20 questions of 1 mark each
5 questions of 2 marks each

B2: Vocational subject
50 marks: { 20 questions of 1 mark each
15 questions of 2 marks each

(iii) Pattern of questions paper for 10+2 Vocational candidates seeking admission to Degree Module in Forestry:

The question paper shall consist of two sections viz. Section A and Section B. Section A will consist of three sub sections: A-1, A-2 and A-3.

The subjects and distribution of marks in Section A shall be as given below:

A-1 (Physics):
20 marks { 10 questions of 1 mark each
5 questions of 2 marks each

A-2: (Chemistry):
20 marks: { 10 questions of 1 mark each
5 questions of 2 marks each

A-3: (Biology):
30 marks { 10 questions of 1 mark each
10 questions of 2 marks each

Section B will consist of two sub sections, viz., B-1 and B-2.

The subjects and distribution of marks shall be as given below:

B1: Common Biology Sciences,
30 marks { 20 questions of 1 mark each

5 questions of 2 marks each

B2: Vocational subject

Forestry / Horticulture,
50 marks { 20 questions of 1 mark each
15 questions of 2 marks each

The questions of Physics and Chemistry shall be the same for 10+2 Vocational (Technology) and 10+2 Vocational (Forestry) candidates.

ELIGIBILITY:

(a) Maximum Age Limit: 23 years (28 years for SC/ST/PH and 26 years for OBC and female candidates) as on **1st August , 2007.**

(b) Qualification:

(i) For Engineering and Technology Stream
10+2 PCM/ PCMB, 10+2 Vocational in Electronics/ Farm Machinery & Equipment / Electrical / Refrigeration & Air Conditioning / Automobile Technology/ Structure & Fabrication Technology/ Computer Science OR NERIST Certificate (E&T). A student of NERIST , who is already registered in a Module can not be allowed to appear at the NEE -2007.

Candidates with 10+2 (Vocational)/ NERIST certificate holders are eligible for admission in Computer Science and Engineering or in their respective branches.

10+2 PCM/PCMB candidate should have passed in Physics, Chemistry and Mathematics separately.

(ii) For Forestry stream
10+2 PCB/PCMB, 10+2 (vocational in Forestry/ Horticulture) or NERIST Certificate (Forestry).

10+2 PCB/PCMB candidates should have passed in Physics, Chemistry & Biology separately.

Candidates appearing in the above mentioned examination, whose results are awaited, may also appear in the Entrance Examination. A certificate to this effect is to be obtained from the Principal of the school/ college and must be attached with the application. In case such a candidate is selected, he/she must produce the original pass certificate and marks sheet at the time of his/her admission. Otherwise, his/her admission will automatically get cancelled. A candidate registered in NERIST Diploma

Module cannot be allowed to appear in the NEE-II.

9.3. NEE-III consisting of one paper of 150 marks and three hours duration will be conducted at various centres located in the eight states of North East. **All questions will be of objective type with multiple choice answers. For every wrong answer to a question 25% (1/4th) of the marks carried by the question will be deducted from the aggregate marks obtained by the candidate**

Scheme for NEE-III

The question paper shall consist of four sections. The subjects and distribution of marks shall be as given below:

Section A (Physics):

25 marks: 25 questions of 1 mark each

Section B (Chemistry) :

25 marks: 25 questions of 1 mark each

Section C (Mathematics):

25 marks : 25 questions of 1 mark each

Section D (Branch subject):

75marks : { 25 questions of 1 mark each
25 questions of 2 marks each

Question of sections A, B & C will be common for all candidates

Questions of section-D will pertain to the relevant branch of engineering/technology

ELIGIBILITY :

(a)Maximum Age Limit: 40 years (45 years for SC/ST/PH and 43 years for OBC and female candidates) as on **1st August , 2007.**

The admission to Degree Module in engineering is made in the following disciplines/branches:-

- i) Agricultural Engineering
- ii) Civil Engineering
- iii) Computer Science & Engineering
- iv) Electrical Engineering
- v) Electronics & Communication Engineering.
- vi) Mechanical Engineering

Diploma holders in the allied discipline/branches as listed in the appendix shall also be eligible to apply.

For admission through NEE-III, a candidate must have passed the 3-year Diploma course from any Government recognized polytechnic in the respective or allied discipline/branch **with 60% marks considering the aggregate marks**

of all the three years, or NERIST Diploma Module (CGPA ≥ 3.00). Those appearing in Final year of three year diploma course may also appear in NEE-III for consideration of provisional admission. All provisional admissions will stand cancelled if proof of having passed the final examination with above mentioned percentage is not submitted by the date of counselling. If an applicant is found ineligible at a later date even after admission, his/her admission will be cancelled. All admissions will be subject to verification of facts from the original certificates/documents of the candidates. A candidate registered in NERIST Degree Module cannot be allowed to appear in the NEE-III.

10. RESERVATION OF SEATS

Out of the total number of seats in each of the modules for direct admission, 80% of seats are reserved for the candidates of the eight states of the North East (10% each) as states' quota. 7% of the seats are filled up from the students of North East on merit. 10% of the seats are filled by the candidates from rest of the States under All India (AI) quota. 3% of the seats are reserved for physically handicapped candidates with 40-75% locomotor disability.

11. FEE STRUCTURE

The fee structure including the hostel seat rent per semester at present is given in the table below:-

Module	Semester	GE	SC/ST
Base	First	Rs. 4030	Rs. 3805
	Other	Rs. 2050	
Diploma	First	Rs. 2740	Rs. 2665
	Other	Rs. 2150	
	Lateral First	Rs. 4480	Rs. 4255
Degree	First	Rs. 3090	Rs. 3015
	Other	Rs. 2250	
	Lateral First	Rs. 5180	Rs. 4955
Degree Forestry	First	Rs. 3340	Rs. 3365
	Other	Rs. 2150	
	Lateral First	Rs. 5080	Rs. 4855

HOSTEL: Caution Money - Rs. 1000/-, Hostel Establishment charges Rs. 500/-, Mess Advance – Rs. 4500/-

Besides the above, a student has to pay a fee of Rs. 250.00 for a self study course taken during the supplementary term in summer.

12. Stipend

The SC/ST students of North Eastern states are generally provided with stipends by the concerned state governments at varying rates from Rs. 250.00 to Rs. 500.00 per month. The North Eastern Council also provides scholarship to the students of the region for study at Diploma and higher levels at rates which vary between Rs. 600 and Rs. 700 per month. The continuance of stipend is subject to the following conditions:

- (i) That his/her contribution to his/her maintenance of discipline in the institute is consistently good and he/she is regular in the classes. Unauthorised absence from the institute/hostel is treated as lapse of discipline.
- (ii) Stipend is payable for the winter break and summer vacation period on students' rejoining after the break/vacation.

13. Daily Work Schedule:

The institute remains open for five days a week with Saturday and Sunday being off day. Classes are scheduled from 8. a.m. to 5. p.m. with one hour flexible lunch break from 12 noon to 2 p.m.

14. Attendance:

All students are expected to attend classes regularly. Permission of the teacher concerned must be taken for any unavoidable absence from classes. A student should have a minimum of 75% attendance in the lecture/laboratory/workshop/drawing classes prescribed for each course, failing which he/she is not evaluated. In extreme situations a 10% relaxation is permitted on medical grounds.

15. Evaluation Procedure:

The evaluation procedure for the theory component of each course consists of three components: teacher's evaluation (class tests, assignments and quizzes etc.), one mid term examination of two hours duration and an end term examination of three hours duration. The practical components of the courses are evaluated based on the performance in the practical classes, practical tests and viva voce.

16. Awards:

The most outstanding students of Certificate/Diploma/Degree are awarded gold medals at the time of convocation.

17. Instructions for Filling the Application Form :

Please read carefully the instructions given in this section before filling in the Application Form. To avoid mistakes and overwriting you should complete the entries item wise first on a plain paper, and after proper scrutiny, transfer the same onto the Application Form. The Application Form must be filled in English only. Use capital letters as far as possible, except for signature. Note that only one application is admissible. If however, more than one application is submitted it must clearly be marked with the word "DUPLICATE" at the top in red ink. **All information including recent photographs in the forms must be identical.** Examination fee in the form of crossed demand draft in favour of 'Director, NERIST', payable at SBI, NIRJULI (Branch Code 9535) must be enclosed with each application. The fee is non-refundable. Any violation of the instructions may make your application invalid. Incomplete applications will be rejected. **Applications without requisite examination fee will summarily be rejected.** For filling up the items at Serial Numbers 1 to 7 use one box for each letter. Leave a box blank after each word.

17.1. Name in Full: Write your full name as given in the records of matriculation or Class-X examination or equivalent in **CAPITAL LETTERS in the given box.**

17.2. Father's Name: Write the name of your father in the given box in CAPITAL LETTERS.

17.3.(i) Legal guardian's Name: Write the name of legal guardian if (a) You are an adopted ward (b) Both your father and mother are not alive.

Attach legal guardianship certificate from First Class Magistrate with the application form.

17.3 (ii). Relationship with the legal guardian: Write your relationship (like uncle, brother etc.)

17.4. Permanent address of Parent/Legal guardian: Write the permanent address of parent/ legal guardian with PIN code in capital letters.

17.5. Mailing Address: Write the complete postal address in **Capital Letters** including PIN Code at which communications are to be made. Also

write the name of the nearest Telegraph Office in space provided.

17.6. Date of birth : Write your date of birth as per the class-X certificate/ school records in the boxes provided.

For Example - If the date of birth is March 5, 1987, then the entries should be –

Day	Month	Year
0	5	0
1	9	8
7		

17.7 (a) Information Code: Fill up the examination Centre Code, State Code, Region Code and Reservation Code from the list of codes given below. In case the number of candidates in a centre is less than a certain number then the candidates may be accommodated in a nearby centre. Use one box for one digit only.

Exam Centre Code	
Code	Exam Centre
01	Agartala
02	Aizawl
03	Dibrugarh
04	Gangtok
05	Guwahati
06	Imphal
07	Itanagar
08	Jorhat
09	Kohima
10	Shillong
11	Silchar

State Code	
Code	Description
1	Arunachal Pradesh
2	Assam
3	Manipur
4	Meghalaya
5	Mizoram
6	Nagaland
7	Sikkim
8	Tripura
9	Others

Region Code	
Code	Description
1	PRC holder of any of the eight north eastern states
2	Others

Reservation Code for PRC holders (for Region code 1)	
Code	Description
01	General
02	OBC

03	SC
04	ST from plain area of Assam
05	ST from Hill area of Assam
06	Khasi/Jayantia from Meghalaya
07	Garo from Meghalaya
08	Other ST from Meghalaya
09	ST of all other states except Assam & Meghalaya
14	Most backward classes (Local with Sikkim subject certificate / Certificate of Identification)

Reservation Code for Others (for Region code 2)	
Code	Description
01	General
02	OBC
03	SC
09	ST of all other states except Assam & Meghalaya
10	Wards of Central/State government or undertaking employees serving in Assam
11	Wards of State government or state undertaking employees of Arunachal Pradesh
12	Wards of Central government or central government undertaking employees serving in Arunachal Pradesh
13	Others (Non PRC holders) residing in Arunachal Pradesh for not less than three years and not covered in any of the above Reservation categories.
15	Others (Children of business community and state government employees)

17.7 (b) Write O in the box for PH code . However, in case you are physical handicapped with 40 to 75% locomotor disability then write 1 in the box.

Physically Handicapped (PH) certificate should be in prescribed format from a Medical Board attached to the Special Employment Exchange/Vocational Rehabilitation Centre for physically handicapped or a Medical Board at District level which should have an orthopaedic surgeon/specialist in Physical Medicine and Rehabilitation as a member.

Permanent Resident Certificate (PRC) should be issued by D.C. or any other duly authorized Revenue Officer. The certificate should bear the office seal, signature with date, name, and the seal of the issuing officer.

Govt. Employee Certificate (GEC) should be issued by the Employer of the candidate's parent/legal guardian.

ST/SC/OBC certificate should be issued by the prescribed authority in the prescribed format. **17.8. Sex:** Write M or F in the box as the case may be.

Sex code	
Code	Description
M	Male
F	Female

17.9.Nationality:Mention your nationality.

17.10. Details of Examination passed : For filling in the details of the examination at class X and other level (if any), write in the appropriate column, the name of the examination, name of the School/College/ Institute from which appeared/due to appear, name of Board/ University, and the year of the examination if already passed. If not passed, enter month and year when appearing or due to appear. In the column Subjects, write subjects taken at qualifying examinations.

Attested photocopies of certificates & marksheets are to be attached. The candidate appearing in final qualifying examination is allowed to appear in the Entrance Test provisionally. However, he/she has to produce the original certificates & marksheets at the time of counselling.

17.11. If you have ever been registered at NERIST, write year, module and branch in the space provided.

17.12. Details of Bank Draft : Examination fee of **Rs.600/- (Rs. 150/-** for SC/ST/handicapped candidates) must be paid along with the completed application in the form of crossed demand draft. The demand draft should be drawn in favour of **‘Director, NERIST’ payable at SBI NIRJULI (Code No. 9535).** Please ensure that the draft is not defective in any way. **The fee shall not be refunded in any case.**

17.13. Declaration by the Applicant :

This must be signed with date by the applicant and countersigned with date by applicant’s Parent /Legal Guardian, otherwise the application will be treated as incomplete and rejected.

18. Identification Record :

Write your full name in capital letters and sign at the appropriate places. Ensure that

a recent passport size photograph, identical to that pasted at the top right corner of the Application Form, is also pasted and properly attested on the front side. Write the name of one of the examination centres from where you intend to appear at the Entrance Examination. The examination centres are **Agartala, Aizwal, Dibrugarh, Gangtok, Guwahati, Imphal, Itanagar, Jorhat, Kohima, Shillong, and Silchar.** However, candidates opting for Itanagar centre may be allotted centre in NERIST at Nirjuli or in any school at Naharlagun or Itanagar, at the discretion of the Institute.

19. Admit Card and Envelope: Write your full name in capital letters and sign at the appropriate place on the Admit Card provided with the Application Form. Ensure that a recent passport size photograph identical to the ones pasted on the Application Form is pasted at the correct place of admit card and is properly attested. Also write in capital letters your name and complete postal address with PIN Code on the envelope marked ‘Admit Card’. Affix **postage stamp of Rs.22/-** on the envelope. Your Admit card will be sent to you in this envelope. You must not mutilate the Admit Card or change any entry made on it, after it has been authenticated.

20. Acknowledgement Card: The purpose of the acknowledgment card is to intimate you about the receipt of your application by the Institute. Write Application Number (as on application form), your name and complete postal address in capital letters with PIN Code at the appropriate places provided in the acknowledgment card. Affix postage stamp of Rs.3/- on the acknowledge card. **The information brochure is to be retained by the applicant for reference.**

21. How to send your completed Application Form?: The completed application form along with all the enclosures should be sent to **Member Secretary (NEE), North Eastern Regional Institute of Science and Technology, P.O. NIRJULI, Arunachal Pradesh, PIN - 791 109** by **Registered Post.** You should firmly tie or staple together the Application Form, Bank draft, acknowledgement card, self-addressed envelope and other enclosures. The application form along with these enclosures should properly be folded and sent in the envelope marked ‘Application Form’ sent to

you along with the Application Form and Information Brochure.

Original Certificates should not be sent but only true copies of these certificates duly attested (with official seal) must be enclosed with the completed application form. The attestation should be done by the Head of the Institution in which the applicant is currently studying/last attended or by a Class-I Gazetted Officer, if not currently studying.

You are advised to see the check list to ensure that all necessary items have been sent.

22. Deadline for receipt of application:

The last date for receipt of completed application form along with requisite fee at NERIST is **February 16, 2007.**

Any application received after this date will not be considered. Any delay in receiving the blank Application Form by the candidate will not be considered as a valid reason for the late submission of the completed Application Form. The Institute will not be responsible for any postal delay or irregularity.

23. Date of Examination: NEE-I April 21st, 2007 (Saturday) ;NEE-II and NEE-III April 22nd, 2007(Sunday).

24. Proof of sending completed

Application Form:

- a) The Institute will send the acknowledgment card with a reference number to the applicant.
- b) No claim of submission of Application Form will be entertained unless it is supported by the acknowledgement card sent by the Institute.
- c) No correspondence with regard to the application, eligibility, admits card etc. will be entertained unless the application number given on the acknowledgment card is quoted.

25. Declaration of result:

The result shall be declared in first week of **June, 2007.** It will be published in local news papers and put on NERIST web site <http://www.nerist.ac.in>

RAGGING IS BANNED IN NERIST AND ANY ONE INDULGING IN RAGGING DURING THE ENTIRE PERIOD OF HIS/HER STUDY IN NERIST IS LIKELY TO BE PUNISHED APPROPRIATELY WHICH MAY INCLUDE EXPULSION

FROM THE INSTITUTE, SUSPENSION FROM THE INSTITUTE OR CLASSES FOR A LIMITED PERIOD, OR FINE WITH A PUBLIC APOLOGY. THE PUNISHMENT MAY ALSO TAKE THE SHAPE OF

1. WITHHOLDING RESULTS.

2. WITHHOLDING SCHOLERSHIPS OR OTHER BENEFITS.

3. SUSPENSION OR EXPULSION FROM HOSTEL OR MESS OR COLLECTIVE PUNISHMENT, IF THE INDIVIDUALS COMMITTING OR ABETTING RAGGING ARE NOT IDENTIFIED, AND/OR AN ENTRY IN THE CONDUCT CERTIFICATE MENTIONING THE ACT OF RAGGING INDULGED IN BY THE STUDENTS CONCERNED.

SYLLABI FOR NEE-I

Full Marks: 150

TIME : 3Hours

Section-A

PHYSICS: 25 Marks
Units for Measurements of Physical Quantities : Fundamental and derived units. System of units.

Force and Motion: Uniform and non-uniform motion. Speed and velocity. Distance-time, speed time and velocity-time graph. Uniform acceleration. Equations of motion and their applications. Force and acceleration, Newton's laws of motion, mass and inertia. Concept of momentum, relation between force and momentum. Elementary ideas of friction and uniform circular motion.

Gravitation: The universal law of gravitation, Newton's third law and gravitation, acceleration due to gravity. Concept of mass and weight. Laws of freely falling bodies under gravity. Elementary representation of projectile motion.

Vibration and Waves: Elementary ideas of periodic and simple harmonic motion, time period and frequency of simple harmonic motion. Simple pendulum and restoring force. Graphical representation of waves. Wavelength, frequency and velocity of waves. Longitudinal and transverse waves, Sound waves.

Work, Power and Energy: Work done by a constant force. Kinetic and potential energy. Power and its units.

Heat and Thermometry: Concept of temperature, measurement of temperature using thermometer. Fahrenheit and Celsius scales of

temperature. Heat energy, specific heat, thermal expansion of solid, liquid and gases. mechanical Equivalent of heat. Change of state and concept of latent heat.

Pressure and Buoyancy: Concept of pressure, liquid and air pressure, atmospheric pressure, measurement of pressure using simple Barometer. Buoyancy and Archimedes' principle, condition of floating.

Magnetism: Magnet and its property, poles of a magnet, magnetic lines of force, different kinds of magnets. Magnetic domains.

Light: Laws of reflection and refraction, reflection and refraction of light at plane and curved surfaces, spherical mirrors. Reflection by spherical lenses. Ray diagram for locating images by lenses and mirrors. Lens and mirror formula and their uses. Linear magnification. Human eye and defects of vision. Elementary idea and ray tracing for microscope and telescope. Refraction through a prism and dispersion of light (basic ideas).

Basic Electricity: Charges, electric lines of force, potential due to a charge. Motion of charges and electric current. Ohm's law. Series and parallel combination of resistances. Electric current and transfer of energy. heating effect of current. Electric power and its units. Electromagnetism and magnetic effect of current. Elementary ideas of electromagnetic induction. Electric motor. Domestic uses of electricity.

Solar System and the Universe: Stars and galaxy, the sun and the solar system, planets and their motion. Formation of the earth. The origin of the universe.

Nuclear Energy: Concept of nucleus of an atom, nuclear fission and fusion.

SECTION-B CHEMISTRY

25 Marks

Atomic Structure : Daltons atomic theory, elements, compounds, cathode ray, X-ray, radio active radiations, Rutherford model of atomic structure. Bohr's model of atomic structure and electronic configurations. Electronic configuration of elements up to At. No.18. Radioactivity and simple nuclear reactions involving C and N. Radio isotope classing.

Classification: Mendeleef and modern periodic table. Electronic configurations of each group, periodic trend of metallic and nonmetallic character, atomic size, nature of bonding and oxides and related chemical properties, metallic change, prediction of properties of an atom.

Chemical bonding: Octate rule or inert gas configuration as criteria of stability. Ions, atom and valency. Ionic bonds, covalent bonds (in simple cases), shape of Molecules of H_2O , NH_3 , CH_4 , CCl_4 , C_2H_4 , SF_6 , Pcl_5 , CO_2 , $[Cu(NH_3)_4]$.

Chemical reactions: Decomposition, displacement reactions, Isomerization reaction, combination reactions, chemical formula and equations, Atomic and Molecular masses, Mole concept, gram atomic mass and gram molecular mass. Determination of formula of unknown compounds and balancing of equations.

Energetic: Bond energy, Energy involved in a reaction. Photo chemical reactions and generation of free radicals. Electrolysis of water and N_aCl , Electrochemical cells (Galvanic cell) dry cells, storage cells, Metallic corrosion.

Metals: Physical and chemical properties, Metal reaction with O_2 , dil acid, Cl_2 , Elementary metallurgy of Cu, Fe, Al, uses of metals, Washing soda, Baking soda, lime, preparation of Bleaching Powder, Plaster of Paris.

Non-metals: Physical and chemical properties, reaction with O_2 , acid, Cl_2 , H_2 , preparation and properties of Si, P, S. Carbon and its compounds: Allotropes of carbon, hydrocarbon, alkanes, isomerism in alkanes, Petroleum, Preparation and properties of CH_3OH , C_2H_5OH , general properties of organic acids - $COOH$ group, esters, Synthetic fibre, Nylon, Polyester, carbon fibre, Plastics, Rubber, Soap, detergents, Biomass as fuel, fossil fuel, coal, petroleum, Natural gas, classification of fuels. Calorific value of fuel, Ignition Temp., Combustion of fuel, Ideal fuel. Coal deposits on earth, constituents of lithosphere, Green house effect, Oceans, composition and its important function.

Sun and Nuclear Energy: Sun and its source of energy, nuclear fission, chain reaction, nuclear reactors, nuclear pollution, energy crisis. Practical: Carbon, Nitrogen and O_2 cycles on earth. Solubility and saturated solutions, solution and suspension, distillation, hard and soft water. To show the presence of CO_2 , water vapour and dust particle in atmosphere. To identify the combustion product of fuels (CO_2 and H_2O only). Condition of rusting, effect of heating on Sulphur Primary air pollutant.

Solubility of ionic and covalent compounds in any given solvent, electrical conductivity of ionic and covalent compounds. Determination of m.p., b.p. of ionic and covalent compound. Heat change during melting of solid or freezing of liquid. Physical change and chemical changes, (Fe+S mixing and heating) Heat of reaction and Heat of dissolution. Construction of Voltaic cells. Relationship between current, time and metal deposited during electrolysis of copper.

SECTION-C BIOLOGY

25 Marks

Ways of Living Habitats: Living Places and Programme. The habitat, Micro habitats, Interdependence, Land, water and air as habitats, Adaptation, Aquatic habitats and Adaptation, Land habitat and Adaptation. Examples of Adaptation in plants & animals, How did adaptation occur, Man manipulates his habitats.

Organization in the living world: Level of organization, General basis of organization, Cell structure, Mitosis and Meiosis-two modes of cell division, The importance of crossing over.

Life Process-I : Nutrition, Photosynthesis, Respiration, Transport of material, Blood circulation, Lymph, Excretion

Life Process-II: Reproduction, Asexual, reproduction, Sexual reproduction, Control and Coordination, Chemical Coordination in plants, Chemical Coordination in Animals, The nervous systems.

Human Beings: Structure of human body, Man exploits the environment.

Nutrition : Energy requirement of the body, Balance diet, Components of our food, When do you need more food, Deficiency diseases, Factors leading to deficiency in Nutrition, Excessive intake of food

Food Production: Agricultural tasks on food production, Food production trends in our country, Food from animals, Animal husbandry, Fish as source of animal food, Trends in food production from animals.

Health: Community and personal health, Factors affecting health, Food poisoning, Organic or metabolic diseases, Pollution related diseases, Diseases related to habit

forming substances, Preventive measures, Health education, Health and development.
Biosphere: Biosphere-Structure and Function, Food chain, Flow of energy, Cycling of materials.

Man and his environment: Human activity, The earth's atmosphere-physical or abiotic environment, Interrelationship between man and his environment, Living resources need proper management and replenishment, Effects of over exploitation and Industrialization, Recycling of waste materials for ecological balance, Natural resources, its exploitation and conservation.

Section-D

MATHEMATICS

75 Marks

Algebra: Sets, their representation and notation, equivalent and equal sets, Finite and infinite sets, Subset, Null set, universal set of a set. Venn diagrams, set theoretic operations and their algebra (union, intersection and complement).

Natural numbers, Integers, Rational and Irrational numbers, Surds (Quadratic surds only).

Polynomials and their operations. First degree equations and in-equations and their solutions including graphical solution for two variables. Solution of simultaneous equations. Factorization of linear expressions and second degree expressions. Quadratic equations and their solutions. Laws of indices, logarithm.

Geometry: Point, Line, Collinear points, Intersecting and nonintersecting lines in a plane. Family of lines

Concurrent lines, Line segments, Ray, Parallel lines, Distance of a point from a line Distance between two parallel lines.

Angles and their measurements, Different kinds of angles-Supplementary, Complementary, Congruent and Adjacent angles. Interior, Exterior and Alternate angles.

Triangles, its sides and angles, Exterior angles, Similarity and congruence of triangles. Basic proportionality theorem. Pythagoras' theorem and its converse. The concept of a circle as a set of points in a plane, Interior and exterior of a circle. Diameter and circumference of a circle. Arc and sector of a circle. Chord and segment of a circle. Secant and tangent of a circle. Family of concentric circles. Family of circles through a given point, concyclic points, circles and common tangent. Direct and transverse common tangents.

Centroid orthocentre and proof of the theorem. In a triangle, the medians pass through the point which divide each of the medians in the ratio 2:1.

Trigonometry: Trigonometrical ratios $\sin x$, $\cos x$, $\tan x$, $\cot x$, $\operatorname{cosec} x$, for 0° , 30° , 45° , 60° , 90° and 180° . Simple trigonometrical identities involving trigonometrical ratios, uses of trigonometrical tables, Problems on height and distances.

Mensuration : Concept of perimeter, Area of triangle, square, rectangle, rhombus, trapezium, quadrilateral, circle and circular ring. Volume of cube.

Statistics: Collection, tabulation and graphical representation of statistical data. Bar graph, Piecharts, histograms, Mean, Median and Mode.

SYLLABI FOR NERIST

ENTRANCE EXAMINATION-II

(Common for PCM/PCB/PCMB students seeking admission in Diploma Module in Engineering & Technology or Degree Module in Forestry).

Full Marks : 150

Time: 3 Hours

SECTIONS :

A	Physics	45 marks
B	Chemistry	45 marks
C	Mathematics	60 marks
D	Biology	60 marks

Section-A Physics 45 marks

Units and Dimensions : Units for measurements, systems of units, fundamental and derived units, SI units, Dimensional analysis and their applications.

Motion in one Dimension : Objects in motion in one dimension, motion in a straight line, uniform motion, its graphical representation and formulae, speed and velocity, relative velocity, instantaneous velocity, Uniformly accelerated motion, its position-time graph, velocity-time graph and formulae, Description of motion using differentiation and integration.

Motion in two and three Dimensions : Vectors and scalars, representations of

vectors in two and three dimensions, unit vector, vector addition and multiplication, resolution of vectors in plane, rectangular components, scalar and vector products. Motion in two dimensions; projectile motion, uniform circular motion, common examples of three dimensional motion.

Law of Motion : Elementary ideas of inertial and non-inertial frames, force and inertia. First law of motion, Second law of motion, impulse, Third law of motion, examples of third law. Momentum linear momentum, conservation of linear momentum. equilibrium of concurrent forces, static and kinetic friction, laws of friction, rolling friction, lubrication.

Work, Energy and Power : Work done by a constant force and variable force; Kinetic and potential energy. Power; conservative and non-conservative forces, work-energy principle. Spring constant, potential energy of a spring. Gravitational potential energy, mass-energy equivalence, conservation of energy, elastic collision in one and two dimensions.

Rational Motion : Centre of mass of a two particle system; centre of mass of a rigid body, general motion of a rigid body, motion of centre of mass, nature of rotational motion, rotational motion of a single particle in two dimensions. Uniform circular motion and their examples. Centripetal and centrifugal forces, torque, angular momentum, conservation of angular momentum. Moment of inertia and its physical significance, statement of parallel axis and perpendicular axis theorem, moment of inertia of ring, disk and straight rod.

Gravitation : Newton's law of gravitation, universal gravitational constant 'G', acceleration due to gravity 'g', mass and density of the earth, inertial and gravitational mass, variations of 'g'. Gravitational potential energy near the earth surface, gravitational potential, orbital velocity, escape velocity, planetary motion, geostationary satellite, Kepler's laws.

Properties of Matter : Inter atomic and intermolecular forces, states of matter. Elastic properties of solids, Hooke's law, Young's modulus, bulk modulus and modulus of rigidity. Definition of Poisson's ratio .

Fluid pressure, Pascal's law, buoyancy, flotation, Archimedes' principle, atmospheric pressure, Surface energy and surface tension, angle of contact, capillary rise, viscosity, sphere falling through a fluid, Stokes' law, streamline flow,

Reynold's number, Bernoulli's theorem and its applications.

Kinetic theory of gases, pressure exerted by a gas, kinetic energy and temperature, measurements of temperature, absolute temperature scale, gas laws and Avogadro's number.

Heat and Thermodynamics : Zeroth and first law of thermodynamics, specific heat of ideal gases at constant volume and constant pressure, relation between them, thermodynamic state, equation of state, pressure temperature phase diagram, Thermodynamic processes - reversible, irreversible isothermal and adiabatic, Carnot cycle. Second law of thermodynamics, entropy (elementary ideas), heat engines, efficiency of heat engines Thermal conductivity, Black body radiation, Kirchhoff's law, Prevost's theory of heat exchange, Wien's law, Stefan's law, Newton's law of cooling.

Oscillations and Waves : Periodic motion, simple harmonic motion, equation of simple harmonic motion, kinetic and potential energy in simple harmonic motion Oscillations due to a spring - mass system, simple pendulum, time period of a simple pendulum, forced oscillations, resonance and damped oscillations.

Wave motion, equation of wave, speed of a wave, principle of superposition, reflection of waves, harmonic waves, formation of standing waves, standing wave in string and pipe, Beats, Doppler effect. Acoustics of buildings. Ultrasonic waves (elementary ideas).

Electrostatics : Charges and their conservation, Coulomb's law, electric field and potential due to a point charge, Dipole, its fields along the axis and perpendicular to the axis, equipotential surfaces. Concept of dielectrics and dielectric constant, Gauss theorem and its applications to determine electric field inside and outside a conducting sphere, Conductors and insulators, Forces and torques experienced by a dipole in uniform electric field, presence of free charges and bound charges inside a conductor. Capacitance, parallel plate capacitor with air and dielectric medium between the plates, series and parallel combination of capacitor, energy stored in a capacitor.

Current Electricity : Electric current, Ohm's law, resistivity, current density, concept of drift velocity and mean free path of charge carriers. Resistance of different materials, temperature dependence of resistance, resistances in series and parallel, Kirchhoff's law-illustrations by simple examples. Wheatstone's bridge and its application in meter bridge; principle of potentiometer - its applications for comparing emf of two cells and determination of internal resistance of a cell.

Thermal and chemical Effects of Current : Electric power, heating effect of current, Joule's law, chemical effect of current and Faraday's laws of electrolysis. Cells - primary and secondary. Thermoelectricity - Seebeck effect and its application, Peltier effect and Thomson effect.

Magnetic effect of Current : Oersted's experiment, Biot-Savart law, magnetic field due to a straight wire and a circular loop, Ampere's law, magnetic field due to solenoid. Force on a moving charge in a uniform magnetic field, cyclotron. Force on a current carrying conductor and torque on current loop in a magnetic field, forces between two parallel current carrying conductors, definition of Ampere, Moving coil galvanometer and its conversion into ammeter and voltmeter.

Magnetism : Natural and man made magnets, properties of a bar magnet, current loop as magnetic dipole, magnetic moment, torque on a magnetic dipole in a uniform magnetic field, lines of force in a magnetic field, Earth's magnetic field and its sources. Tangent galvanometer, vibration magnetometer, Para-, dia- and ferromagnetic substances,; electromagnets and permanent magnets.

Electromagnetic Induction and Alternating Current : Induced emf, Faraday's laws, Lenz's law electromagnetic induction, self and mutual inductance, Alternating current, impedance and reactance, power in AC, circuit with L, C and R, series circuits, phasor diagram, resonance circuit. Electrical machines and devices - transformers, AC generators, choke and starter.

Electromagnetic Waves : Elementary idea of electromagnetic waves, electromagnetic spectra, radio and microwaves, infrared, visible, ultraviolet, X-rays and γ - rays, Elementary idea of propagation of electromagnetic waves in atmosphere.

Waves Optics : Wave front and Huygen's principle. Reflection and refraction of plane wave

at a plane surface. Interference - Young's double slit experiment, Diffraction - diffraction due to single slit, linearly polarized light, use of polarized light and polaroids, Doppler effect.

Ray Optics and Optical Instruments : Sources of light, luminous intensity, luminous flux, reflection of light at plane surfaces and spherical surfaces, curved mirrors, mirror formula. Refraction of light, refractive index, total internal reflection, spherical lenses, thin lens formula, lens maker's formula and magnification. Refraction and dispersion of light due to prism, spectrometer - its use for the determination of refractive index of material of a prism, Spectra absorption and emission, scattering of light in atmosphere, primary rainbow. Optical instruments - simple and compound microscopes, refracting and reflecting telescopes, resolving and magnifying power of a telescope.

Electrons and Photons : Electrical conduction in gases. Production and properties of cathode rays, Thomson's experiment for e/m of electrons, charge of electron by Millikan's oil drop experiment. Particle nature of light, Einstein's photoelectric equation, photo cells.

Atoms Molecules and Nucleus : Alpha particle scattering experiment, size of nucleus, Rutherford's model, Bohr's model, energy quantization, hydrogen spectrum, Composition of nucleus, atomic masses, radioactivity, alpha, beta and gamma rays and their properties, radioactive decay. Mass-energy relation, binding energy and mass defect. Nuclear fission, controlled and uncontrolled nuclear reactions, nuclear reactor, and nuclear fusion.

Solids and Semiconductor Devices : Energy bands in solids, conductors, insulators and semiconductors, semi conducting materials - Si and Ge, P-N junction, diodes, solar cells, junction transistors, diode as a rectifier, transistor as an amplifier and an oscillator; Logic gates.

Section-B Chemistry 45 marks
(Common for PCM/PCB/PCMB Students seeking admission in Diploma Module in

Engineering & Technology or Degree Module in Forestry).

Atoms, Molecules and Chemical Arithmetic : Measurement in Chemistry. Chemical classification of matter, laws of chemical combination and Dalton's atomic theory, atomic mass, chemical equation.

Structure of Atoms and Molecules : Constituents of the atom, electronic structure of atom, understanding electron behavior, Bohr's model of hydrogen and hydrogen like atoms, spectrum of hydrogen, Heisenberg's uncertainty principle, Pauli's exclusion principle, Hund's rule of maximum multiplicity. Orbital and quantum numbers, shapes of orbital, Aufbau principle, electronic configuration of elements up to atomic number 30, Chemical bonding, Hybridization with reference to C_2H_2 , $BeCl_2$, BF_3 , C_2H_4 , CH_4 , CCl_4 , SF_6 , PCl_5 , H_2O and NH_3 molecules, bond distance.

State of Matter : The gaseous state, kinetic molecular theory of gases. Laws governing the ideal behavior of gases, deviation from the ideal behavior, Van der waals equation of state for real gases.

The Solid State : Structure of simple ionic compounds, Close - packed structure, ionic radii, silicates, imperfections in solids; properties of solids, and amorphous solids.

Solutions : Types of solution, Vapor pressure of solution and Raoult's law. Colligative properties, ideal and non-ideal solutions. Abnormal molecular masses.

Energetic : Energy changes during a chemical reaction, internal energy and enthalpy. Heat of reaction, sources of energy, What decides the direction of spontaneous change in a chemical reaction? why is there energy crisis if energy is conserved in nature?

Chemical Thermodynamics : Some basic concepts; first and second law of thermodynamics, absolute entropies and third law of thermodynamics.

Chemical Equilibrium : Equilibrium involving physical changes and chemical system, effect of changing the condition of system of equilibrium, Le-Chatelier's principle and its applications. Equilibrium involving ions. Ostwald's dilution law, concept of Bronsted-Lowry and Lewis acid-base.

Chemical Kinetics : Rate of reaction, the instantaneous rate of a reaction and order of a reaction, factors affecting the rate of a reaction,

effect of light on rates of reaction. Elementary reaction steps to more complex reactions, how fast are chemical reactions?, experimental determination, Dependence of reaction rate on temperature, Photochemical reactions, Mechanism of a reaction.

Bonding and Molecular Structure : Chemical bonds and Lewis structure, Shapes of molecules, Quantum theory of covalent bonds. The coordinate covalent bond, bonding in solid state, the hydrogen bond, Resonance.

Redox Reactions : Oxidation and reduction in an electron transfer process, redox reactions in aqueous solutions, electrochemical cells, EMF of a cell, the dependence of EMF on concentration and temperature Electrolysis, Oxidation number, balancing of oxidation reduction equations.

Electrochemistry : Electrolytic conductance, Equivalent and molar conductivities, Quantitative aspect of electrolysis, Galvanic cell, Electrode potential and EMF of a Galvanic cell, Electrochemical cell and free energy, Electrolysis, Faraday's Laws and criteria for product formation, Some commercial batteries, Corrosion.

Elements, their Occurrence and Extraction : Earth as a source of elements, Elements in the living beings, Elements in sea, Extraction of metals, Mineral wealth of India. Qualitative tests of metals.

Chemistry of Non-metals-I : Hydrogen, Oxygen, Nitrogen, Water and Hydrogen peroxide.

Chemistry of Non-metals-II : Boron, Silicon, Phosphorus, Sulphur, Halogens, Noble gases.

Chemistry of Lighter Elements : Sodium and Potassium, Magnesium and Calcium, Aluminum. Biological role of Sodium, Potassium, Magnesium and Calcium.

Chemistry of Heavier Metals : Iron, Copper, Silver, Gold, Zinc, Mercury, Tin, Lead.

Chemistry of Main Group Elements : Alkali metals, Alkaline earth metals, Boron family, Carbon family, Nitrogen family, Oxygen family, Halogen family, Noble gases and Hydrogen.

Transition Metals including Lanthanides : Electronic configuration, Physical and chemical properties of element. General properties of first row transition metal compounds, some general group trends in the chemistry of transition metals. Elements of the lanthanides and the actinide series.

Coordination Compounds and Organometalics : Coordination compounds, isomerism and bonding in coordination compounds; stability of coordination compounds in solution, importance of coordination compounds. Organometallic compounds.

Carbon and its Compounds : Elemental carbon, carbon compounds; inorganic and organic compounds of carbon, nomenclature of organic compounds, some common organic compounds.

Structure and Shape(s) of Hydrocarbons : Alkanes, Stereoisomerism and chirality, alkenes, alkynes and arenes.

Preparation and Properties of Hydrocarbons : Sources of hydrocarbons, Laboratory preparation of alkanes, alkenes and alkynes, physical properties of alkanes, Reactions of hydrocarbons.

Organic Chemistry based on Functional Group-I : Nomenclature, General methods of preparation, properties and uses of haloalkanes, haloarenes, polyhalogen compounds, alcohols, phenols. Commercially important alcohols and phenols.

Organic Chemistry based on Functional Group-II: Nomenclature, general methods of preparation, properties and uses of ethers, aldehydes, ketones, carboxylic acids and derivatives of carboxylic acids.

Organic Chemistry based on Functional Group-III: Nomenclature, general methods of preparation properties and uses of cyanides, isocyanides, amines and nitro compounds.

Purification and Characterization of Organic Compounds: Purification, qualitative and quantitative analysis, determination of molecular mass, calculation of empirical and molecular formulae, Some examples in organic quantitative analysis. Modern methods of structure elucidation.

Nuclear Chemistry : Discovery of radioactivity and the nature of radiation from redox active substances, Chemical equations for nuclear changes, radioactive series, rate of radioactive decay, artificial transmutation and artificial radioactivity, Synthetic elements, Nuclear fission, Nuclear fusion. Applications of radioactivity and radioisotopes.

Synthetic and Natural Polymers : Classification and molecular mass of polymers, Some commercially important polymers.

Surface Chemistry : Adsorption, the colloidal state, emulsions, catalysis, heterogeneous catalysis.

Biomolecules : Structure and function of carbohydrates, proteins, enzymes, nucleic acids and lipids.

Chemistry of some Biological Processes : Cellular energetics, photosynthesis, digestion, metabolism. Water and blood, the vital fluids. Immune system. Hormones, Vitamins, Chemical evolution and origin of life. Genetic engineering and biotechnology.

Chemistry in Action : Dyes, chemicals in medicines. Chemistry of rocket propellants

Section-C Mathematics 60 marks

(For PCM/PCMB Students seeking admission to Diploma Module in Engineering & Technology).

Algebra : Set : Algebra of sets, Cartesian product, Function, Domain and Range of a function etc. Function from $A \times A \rightarrow A$, Associativity and Commutativity of binary operations, Inverse of a function.

Complex Numbers: Square root of a complex number, cube root of unity, Triangle inequality.

Quadratic Equation : Identity and equations, solution of a quadratic equation in complex number system, Equations reducible to quadratic equations, Relation between roots and coefficients, Nature of

the roots, Formation of quadratic equation with given roots, Symmetric functions of roots of quadratic equation.

Permutations and Combinations : Standard results on ${}^n P_r$ and ${}^n C_r$, Applications including circular permutations.

Binomial Theorem : Binomial theorem for any index, General and particular terms, Application of binomial theorem for approximation, properties of binomial coefficients.

Matrices and Determinants : Definition of matrix, types of matrices, Algebra of matrices, singular and non singular matrices, Linear equations in matrix notation. Determinants, Minors and cofactors of determinants, Expansion of a determinant, properties and elementary transformation of determinants, Application of determinants in solution of equations, Cramer's rule, Adjoint and Inverse of matrices and its properties, Inverse of a matrix using elementary row transformations, Application of matrices in solving simultaneous linear equations in three variables.

Exponential and Logarithmic Series : The infinite series for e^x , Infinite series for $\log(1-x)$, $\log(1+x)$ etc and related problems.

Trigonometry : Relation between the sides and the trigonometrical ratios of the angles of a triangle, Simple problems on solutions of triangle, Inverse trigonometric functions. Principal value branches of inverse trigonometric functions.

Coordinate Geometry : Orthocentre, circumcentre and centroid of a triangle, Family of lines, parametric equation of a circle, Equation of tangent and its length, system of circles, Conic sections, Parabola, ellipse and hyperbola - standard forms.

Vector and its Applications to Geometry : Vector as directed line segment, Magnitude and direction of a vector, Equal vectors, unit vector, Zero vector, position vector of a point, Components of a vector, Vectors in two and three dimensions; addition of vectors, multiplication of a vector by a scalar, position vector of the point dividing a line segment in a given ratio, application of dot and cross products in (i)

finding areas of triangle and parallelogram
(ii) finding work done by a force (iii)
vector moment of a vector about a point
(iv) problems of plane geometry and
trigonometry, scalar triple product and its
application, co planarity of three vectors .

Three Dimensional Geometry :
Decomposition of a vector into three non-
coplanar directions as base in 3-D,
direction ratios and direction cosines for
any vector, Angle between two vectors
where direction cosines are given, Distance
between two points, Condition for the
intersection of two lines, Shortest distance
between two lines, equation of a plane
containing a given point and normal to a
given direction, angle between two planes,
Angles between a line and a plane,
Distance of a point from the plane,
Equation of any plane passing through the
intersection of the two planes, equation of a
sphere in (i) central form (ii) general form
(iii) diameter form.

Differential Calculus : Differentiation of
Logarithmic and Implicit functions,
Differentiation of parametric functions,
Application of Derivatives, Rolle's
theorem, Mean Value theorems, tangent
and normal, increasing and decreasing
functions, maxima and minima, curvature,
asymptotes, tracing of curves.

Integral Calculus: Simple integration,
Integration by parts, integration by
substitution, Integration of rational and
irrational functions, Integration of
Trigonometric functions of the type $\int dx /$
 $(a + b \cos x)$, $\int dx / (a + b \sin x)$; and $\int \sin$
 $m x \cos^n x dx$.

Definite integrals, Evaluation of definite
integrals, application of definite integrals in
finding (i) the areas of simple curves, (ii)
volumes and surfaces of solids of
revolution.

Differential Equations : Order and
Degree of a differential equation, solution
of differential equation by the method of
variables separable, homogeneous and their
solution, linear equation of the first order.

Statistics: Classification, tabulation and
graphical representation of data. Measures

of central tendency such as mean and median.
Standard deviation, variance, Mean deviation and
mean deviation from median as a measure of
location.

Bivariate frequency distribution, marginal and
conditional frequency distribution, correlation
coefficient. Use of scatter diagram in
interpreting the values of correlation coefficient,
calculation of regression coefficient and the two
lines of regression by the method of least squares.
Random experiment and associated sample
space. Event, Algebra of events, classical
probability. Law of addition of probabilities.
Multiplication law of probability and conditional
probability . Independent events, Bayes Theorem.
Random variables, Probability mass function,
different random experiments giving rise to
random variables with the binomial distribution.

Correlation and Regression : Bivariate
frequency distributions as arising from
observations of two variables on the same unit of
observation, Marginal and conditional frequency
distributions, derived from a bivariable frequency
distribution, The concept of relationship between
variables introduced as the dependence of
conditional distribution on the values of the
conditioning variable, Distinction between
relationship and functional relationship.

Correlation analysis as the measurement of the
strength of relationship between two quantitative
variables and regression analysis as the method
of predicting the values of one quantitative
variable from those of the other quantitative
variable.

Definition and calculation of the correlation
coefficient, positive and negative correlation,
perfect correlation, Use of the scatter diagram in
interpreting the values of the correlation
coefficient.

Calculation of the regression coefficient and the
two lines of regression by the method of least
squares, Use of the lines of regression for
production.

Probability : Random experiment and
associated sample space (i.e. set of all outcomes),
Events as subject of the sample space, occurrence
of an event, sure event, impossible event,
mutually exclusive events, elementary events,
equally likely elementary events, Definition of
probability of an even as the ratio of the number
of favourable equally likely events, to the total

number of equally likely events, Addition rule for mutually exclusive events.

Combination of events through the operations “GT” and “Not”, and their set representation, Probability of the events “A” or “B”, “Not A”. Conditional probability Independent events; Independent experiments, Calculation of probabilities of events associated with independent experiments, Applications of Bayes theorem.

Random variables as a function on a sample space, (only random variables taking units number of values to be considered).

Distribution of a random variable derived from the probabilities of events of the sample space on which the random variable is defined.

Binomial/Distribution : Examples of different random experiments giving rise to random variables with the binomial distribution.

Section-D Biology 60 Marks

(For PCB/PCMB Students seeking admission in Degree Module in Forestry).

Multicellularity in Plants (Angiosperms):

Morphology and Anatomy of flowering plants, Absorption and Movement of Water in plants, Mineral and Nitrogen? Nutrition in plants, Photosynthesis, Reproduction in Flowering Plants, Growth and Development of Flowering Plants.

Multicellularity in Animals :

Animal Tissues, Animal Nutrition, Respiratory Gas Exchange, Circulation of Body Fluids, Excretion and Osmoregulation, Movements and Locomotion, Control and Coordination, Nervous system, Endocrine system, Animal Reproduction, Embryonic Development, Growth, Repair, Regeneration, Aging and death.

Continuity of Life : Elements of Heredity and Variation, Genes and Chromosomes, Genetic Material and its replication,

Transcription and translation, Gene expression and its regulation.

Origin and Evolution of Life : Origin of life, Relationship among organisms and evidences of evolution, Theory of evolution by natural selection and other theories of Human evolution.

Application of Biology : Domestication of plants and Improvement of crops, Domestication and Improvement of Animals, Agricultural chemicals, Pesticides, Bio-fertilizers and biological pest control, Genetic conservation and new crops, Understanding human diseases, Common human diseases, Mental health, Addiction and community health, Technology for medical applications, Bio-energy, Biotechnology, Growth of human population.

II. For 10+2 vocational or NERIST Certificate (Engineering & Technology) candidates seeking admission to Diploma module in Technology.

Full Marks : 150

Time: 3 Hours

Section- A

A-1 Physics 20 marks

A-2 Chemistry 20 marks

A-3 Mathematics 30 marks

Section-B

B-1.Common Engineering Sciences

30 Marks

B-2 Vocational subject

50 Marks

Section A-1 Physics 20 Marks

Units and dimensions : Units for measurements, systems of units, fundamental and derived units, SI units. Dimensional analysis and their applications.

Motion in one and two dimensions : Objects in motion in one dimension, motion in a straight line, uniform motion, its graphical representation and formulae, speed and velocity, instantaneous velocity, uniformly accelerated motion, its position-time graph, velocity-time graph and formulae.

Vectors and scalars, representations of vectors in two dimensions, unit vector, vector addition and multiplication, Resolution of vectors in plane, rectangular components, Scalar and vector products, Motion in two dimensions, projectile motion, uniform circular motion.

Laws of motion : Force and inertia, first law of motion, Momentum, second law of motion,

impulse, Third law of motion, examples of third law, linear momentum, conservation of linear momentum, Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication.

Work, Energy and Power : Work done by a constant force, Kinetic and potential energy, power, Work-energy principle, Spring constant, Gravitational potential energy, Conservation of energy, Elastic collision in one dimension.

Rotational motion : Centre of mass of a two-particle system, centre of mass of a rigid body, general motion of a rigid body, motion of centre of mass, nature of rotational motion, rotational motion of a single particle in two dimensions, Uniform circular motion and their examples, centripetal and centrifugal forces, Torque, angular momentum, conservation of angular momentum, Moment of inertia and its physical significance.

Gravitation : Newton's law of gravitation, universal gravitational constant 'G', acceleration due to gravity 'g', mass and density of the earth, inertial and gravitational mass, variations of 'g'. Gravitational potential energy near the earth's surface, gravitational potential, orbital velocity, escape velocity, geostationary satellite.

Properties of matter : Inter atomic and intermolecular forces, states of matter, Elastic properties of solids, Hooke's law, Young's modulus, bulk modulus and modulus of rigidity. Fluid pressure, Pascal's law, buoyancy, flotation, Archimedes' principle, Atmospheric pressure. Surface Energy and Surface Tension, angle of contact, Capillary rise, Viscosity, Stokes law, streamline & Turbulent flow, Reynold's number, Bernouille's Theorem & its applications.

Heat and thermodynamics: Kinetic theory of gases, pressure exerted by a Gas, kinetic Energy & Temperature, Measurement of temperature, Absolute

temperature scale, Gas Laws and Avogadro's number. Specific heat of solids & liquids, Latent heats of fusion & vapourisation, Transfer of heat.

Oscillations and waves: Periodic motion, simple harmonic motion, equation of simple harmonic motion, kinetic and potential energy in simple harmonic motion, Oscillations due to a spring mass system, simple pendulum, time period of a simple pendulum. Wave motion, speed of a wave, principle of superposition, reflection of wave, Standing waves in string (graphical representation), Sound wave and its propagation in different media, Effect of pressure and temperature on velocity of sound waves, characteristics of sound waves.

Electrostatics: Frictional Electricity, charges and their conservation, Coulomb's law, Electric field and potential due to a point charge, Dipole, its fields along the axis, Concept of dielectric and dielectric constant, Conductors and insulators. Presence of free charges and bound charges inside a conductor, Capacitance, parallel plate capacitor with air and dielectric medium between the plates, series and parallel combination of capacitors, energy stored in a capacitor, Van de Graff generator.

Current electricity: Electric current, Ohm's law, resistivity, resistance of different materials, temperature dependence of resistance, resistances in series and parallel, Kirchoff's law - illustrations by simple examples, Wheatstone's bridge and its applications for comparing emf of two cells and determination of internal resistance of a cell.

Thermal and chemical effects of current : Electric power, heating effect of current, Joule's law, Chemical effect of current and Faraday's laws of electrolysis, Cells - primary and secondary, Thermoelectricity - Seebeck effect and its application.

Magnetic effect of current : Oersted's experiment, Force on a moving charge in a uniform magnetic field, Force on a current carrying conductor and torque on current loop in a magnetic field, forces between two parallel current carrying conductors, definition of Ampere, Moving coil galvanometer and its conversion into ammeter and voltmeter.

Magnetism : Natural and man made magnets, properties of bar magnet, current loop as magnetic dipole, Lines of force in a magnetic field, Comparison of bar magnet and solenoid, Earth's magnetic field, Tangent galvanometer, vibration magnetometer, Electromagnets and permanent magnets.

Electromagnetic induction and alternating current : Induced emf, Faraday's laws, Lenz's law, electromagnetic induction, self and mutual inductance,

Ray Optics and Optical Instruments : Sources of light, luminous intensity, luminous flux, Reflection of light at plane and spherical surfaces, Curved mirrors, mirror formula. Refraction of light, refractive index, total internal reflection, spherical lenses, thin lens formulae, lens maker's formula, magnification. Refraction and dispersion of light due to prism, spectrometer - its use for the determination of refractive index of material of a prism, Scattering of light in atmosphere, primary rainbow, Optical instruments - simple and compound microscopes, refracting and reflecting telescopes.

Section A-2 Chemistry 20 Marks

Structure of the Atom : Discovery and properties of sub-atomic particles (electron, proton and neutron), Rutherford's atomic model, Bohr's model of hydrogen and hydrogen like atoms, Spectrum of hydrogen, Heisenberg's uncertainty principle, concept of atomic orbitals, shape of s- and p- orbitals, formation of σ - and π - bonds, Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau principle, electronic configurations of elements upto atomic number 20.

Chemical bonding : Ionic, covalent, coordinate covalent, hydrogen and metallic bonds. Properties of compounds having these bonds. Hybridization (sp , sp^2 , and sp^3) and shape of simple molecules like $BeCl_2$, BF_3 , CH_4 etc.

Periodic table : Mendeleev's periodic table and long form of the periodic Table (main features, merits and demerits), Periodic properties (metallic character, ionization potential, electron affinity and electronegativity), Classification of elements into s-, p-, d- and f- blocks, General properties of s- and p- block elements.

Gaseous state : Physical properties of gases, Laws governing their behavior (Boyle's law, Charles's law, Avogadro's law, Dalton's law of partial pressure, Graham's law of diffusion), Ideal gas equation, Kinetic molecular theory of gases, Pressure exerted by the gas molecules on the walls of the container, Deviation from the ideals behavior, Van der Waal's equation of state.

Solutions : Definition and types of solutions, Solubility and the solubility curve, effect of temperature on solubility, concept of vapor pressure, boiling point and freezing point, Ideal and non ideal solutions. Determination of molecular masses by depression of freezing point/ elevation of boiling point method.

Chemical equilibrium : Reversible reaction, Law of mass action and its application to chemical equilibrium, Homogeneous and heterogeneous equilibrium, Le Chatelier's principle and its application, Ionic equilibrium in aqueous solutions, Theory of electrolytic dissociation, Ostwald's dilution law, Concept of strong acid and base, Bronsted and lawry concept of acid and base.

Redox reactions : Oxidation and reduction processes (classical and modern concepts), Oxidation state, Calculation of equivalent mass of oxidizing and reducing agents, balancing of Redox reactions using change in oxidation number method and Ion electron method.

Electrochemistry : Faraday's laws of electrolysis (statement, explanation and application), Numerical problems, Electrical conductance in solution, specific, equivalent and molar conductance, General concept of Galvanic cell and its representation, Electrode potential, Standard hydrogen electrode and reference electrode, EMF of a Galvanic cell.

Colloidal state : Types, Classification, preparation and properties of colloidal Solutions,

Coagulation of colloids, Emulsion and gel, Importance and application of colloids.

Organic chemistry : Definition and scope of organic chemistry. Hydrocarbons (definition and classification). Functional groups and homologous series. Nomenclature of hydrocarbons and compound containing one functional group.

Alkanes, Alkenes and Alkynes (Preparation and properties, laboratory preparation of methane, ethane and ethyne).

Aromatic hydrocarbons, preparation and properties of benzene.

Compounds containing one functional group, simple methods of preparation and properties of alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amino and nitro- compounds.

Section A-3 Mathematics 30 Marks

(For admission to Diploma Module in Engineering and Technology).

Complex Numbers : Complex numbers in the form $a+ib$, representation of complex numbers by points in a plane, Argand diagram, Algebra of complex numbers, Modulus and argument of a complex number, conjugate of a complex number.

Sequence & Series : Sequences, example of finite and infinite sequences, first term, common difference and n th term, sum of n terms of an A.P., construction of an A.P., Arithmetic means, Insertion of A.M. between any two given numbers. Geometric progression, first term, common ratio and n th term, and sum to infinity, Geometric means, insertion of G.M. between any two given numbers, recurring decimal numbers as G.P., special series $\sum n$, $\sum n^2$, $\sum n^3$ and Arithmetico-Geometric series.

Permutations and Combinations : Fundamental principle of counting and meaning of $n!$, permutation as arrangement, combination as selection, meaning of ${}^n P_r$ and ${}^n C_r$ simple applications including circular permutations.

Mathematical Induction's : Principle of mathematical Induction and its simple applications.

Binomial Theorem : Proof of the theorem for positive integral exponent using principle of mathematical induction, general and middle terms, greatest term in the expansion of $(a+x)^n$.

Partial Fraction : Meaning of partial fraction, the process of breaking up a single fraction into a number of fractions (non-repeated linear factors, repeated linear factors, non-repeated quadratic factors, and the repeated quadratic factors in the denominator).

Trigonometry : Measurement of angles (Radian measure of angles, Relation between degrees and radians), the six trigonometric ratios (sine, cosine, tangent, cosecant, secant, cotangent). Values of trigonometric ratios of 0° , 30° , 45° , 60° , 90° , 120° , 135° , 150° , 180° , trigonometric ratios of angles of any size and sign, Ratios for $90^\circ - \phi$, $90^\circ + \phi$, $180^\circ - \phi$, $360^\circ + \phi$, $360^\circ - \phi$, trigonometric identities (involving the angles of a triangle), trigonometrical ratios of the sum and difference of two angles, product formula, trigonometrical ratios of multiple and sub multiple angles, conditional trigonometric identities, solution of triangles.

Coordinate Geometry (2D) : Cartesian system of rectangular coordinates : Coordinate system in a plane, the graph of the coordinates, Distance formula, Area of triangle, condition for collinearity of three points, section formula, centroid, locus and its equations.

The straight line : Various forms of equations of a line (point-slope form, slope-intercept form, normal form, the general form), Intersection of lines. Angle between two lines, condition for parallelism and perpendicularity, condition for concurrency of three lines, distance of a point from a line.

Circles : Standard form of the equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be a tangent to the circle.

Differential Calculus : Concept of functions, Representation of functions, graph of the functions, algebra of functions idea of limits, concept of limits (intuitive and mathematical approach), one sided limits (Right hand and Left hand), algebra of limits, infinite limits and limits at infinity, concept of continuity, algebra of continuous functions, continuity in a closed interval, Discontinuity, concept and significance of derivatives, Differential coefficient of a function using first principles, Derivatives of sum, difference, product and quotient of functions, derivatives of composite functions (the chain rules), Derivatives of trigonometric, exponential and logarithmic functions, Derivative of some special type of functions. (Inverse trigonometric functions, hyperbolic functions, implicit functions, functions in the parametric form, function with respect to another function). Indeterminate forms (0/0) form : L Hospital's Rule, other indeterminate forms.

Section B-1

Common Engineering Science 30 marks

(Common for 10+2 Vocational and NERIST Certificate holders seeking admission to Diploma Module in Engineering & Technology.)

Engineering Drawing : Lines, lettering and dimensioning, geometrical construction, scales, Engineering curves, cycloids, projection of points, straight lines, planes and solids, sectional views, development of surfaces, isometric view.

Workshop : Hand tools for carpentry and fitting, forging, welding, specification and use, various operations : sawing, planning, chiseling, joining, filing, marking, chipping, gas cutting, maintenance and types of maintenance (preventive and corrective), materials for machine components.

Mechanics : Vector concept, force and force system, static equilibrium, Newton's laws of motions and derived concepts like fiction, centroid, area, moment of inertia,

work energy principle and application of impulse.

Electricity : Concept of voltage, current, resistance, power and energy, relation between electrical, mechanical and thermal units, temperature weft of resistance. Ohm's law, series, parallel, circuits and Kirchoff's law, Capacitance and inductance.

Section B2

Vocational Subject: 50 Marks

(For 10+2 Vocational or NERIST Certificate holders in Technology seeking admission to Diploma Module in Engineering and Technology. A candidate is required to appear in only one of the following vocations /Trades).

Agricultural Engineering:

FARM EQUIPMENT TRADE:

Types of tractors, their technical specifications, Working principles of tractor engines, engine components, Various systems, Fuel, lubrication, cooling, electrical, intake and exhaust systems, Servicing, overhauling and trouble shooting of engine and tractor, Working principles and operational details of clutch, gear box, differential, final drive, steering, brake and hydraulic system, Tyre, tube and wheel ballasting, Hitching of implements.

Track Type Tractors : Tractor chassis, type of suspension, front idler, track shoe, tract shoe idler and carrier rollers, track life, steering mechanism, transmission system, Repair and maintenance, Trouble shooting chart.

Power Tiller : Power transmission system, brake, clutch, chassis, trouble shooting, their repair and maintenance. Equipments required for seed bed preparation, sowing, planting, interculture, irrigation, plant protection, harvesting and threshing. Their types, repair and maintenance. Operator's safety and efficiency, Economics and selection of tractors.

FOOD PROCESSING TRADE:

Physical and chemical properties of foods; nutritive values of foods, browning reactions,

food additives, unit operations such as washing, cleaning, grading, sorting, sizing, heating and cooling etc., Food preservation methods, viz. - thermal processing, drying and chilling, Operation and maintenance of process equipment, Manufacture of fruits and vegetable products such as juices, powder, chutney, pickles etc., Drying, dehydration and freezing of fruits and vegetables. Composition of milk, unit operations such as filtration, clarification, cream separation, boiling and pasteurization, Production methods for butter, cheese, ice cream, condensed milk etc. Stunning, slaughtering and dressing in meat production, Meat tenderization, preservation of meat, egg, fish and their products, Canning of fish, Food packaging principles, materials and various methods.

Civil Engineering:

Construction Technology (Draftsman/Surveyor Trades):

Construction Material : Rocks, bricks, soils, tiles, lime and cement mortar, concrete, timber, steel, paints and varnish, distemper, plastics, glasses, asphalt, sound and heat insulating material.

Construction and Maintenance : Foundation, brick and stone masonry, doors and windows arches and lintels, roofs, floors, stairs, walls, roads, railway, bridge and culverts, hydraulic structures such as dams, canals etc.

Surveying : Basic principles of chain, compass, plane table and theodolite surveying, levelling, contour maps, planimeter, Ghat tracer, Abne level, box sextant.

Water Supply and Sanitation : Sources of water, pumps and pipe, appurtenances in distribution system, sanitary system, construction and maintenance of Sewers, different types of water supply and sanitary fittings, septic tank.

Civil Engineering Drawing and Drafting : Drawing of various civil engineering related structures such as buildings,

bridges, dams, canals, elevated tanks, trusses, tracing.

Estimation and Quantity Surveying :

Estimation of earthwork, masonry, concreting, flooring, plastering, white washing and painting, wood and steel work, RCC works and sanitary fittings etc., Rate analysis and specifications of construction materials and various items of work.

Electronics Communication

Engineering:

ELECTRONICS TECHNOLOGY OR ELECTRONICS MAINTENANCE TRADE :

Circuits and Devices : Semiconductors, type of semiconductors, doping, p-n junction diodes and their characteristics, Bipolar transistor, transistor, biasing, CE, CB and CC configurations and their characteristics, principles of class A, AB, B & C amplifier, gain, bandwidth, introduction to feedback amplifiers, Sinusoidal oscillator, clipping and clamping circuits, Mono-stable and Astable multivibrators.

Fundamentals of Communication & Radio Engineering :

E.M. wave propagation - ground wave, space wave and sky wave, Antenna radiation, different types of Antenna, Analog communication, AM, FM, principles of multiplexing - FDM & TDM, Introduction to digital communication, Multi - channel telephony, Super heterodyne receiver, typical circuits of various stages of transistorized receivers, working principle, RF and IF alignment, AVC and AGC.

T.V. and Audio System :

Monochrome T.V., Interlace scanning, synchronization, blanking pulses, bandwidth requirement, VSB, Picture resolution, typical circuits of the Video amplifier and EHT stages, function of keyed AGC, AFC, various controls in a T.V. receiver, Acoustics, high fidelity and high quality sound, sound recording - Disc and Tape, pool recording systems, equalization, Microphones and speakers, P.A. system, Record player, concept of Hi-Fi stereo.

Instruments : Resistors, capacitors and inductors, Printed circuit board. Ammeter and Voltmeter - different types and their working

principle. Analog and digital multimeters, DC power supply, Cathode ray oscilloscope and signal/function generators.

Electrical Engineering:

ELECTRICAL TECHNOLOGY OR ELECTRICAL MAINTENANCE TRADE:

Basic Electricity : Primary, Secondary cell and charging of lead acid batteries, Capacitance and inductance their series, and parallel connection and energy storage, A.C. fundamental, wave shape, cycle, frequency, time period, peak, average and r.m.s. value, form factor, phase difference, peak factor, power factor, Series A.C. RLC circuit.

Electrical Machine : Magnetic effect of current, Faraday's law of electro-magnetic induction, force acting on a current carrying conductor in a magnetic field and torque production, D.C. machine-working principle of D.C. motor and D.C. generator, D.C. motor starting and speed control, common faults, causes, testing and applications, Single phase transformer - working principle. Turns ratio, voltage, current, power relation and applications, Single phase A.C. motor - commonly used single phase A.C. motors, starting, speed control, installation, testing, common faults and their causes and testing, Universal motor.

Instruments : Permanent magnet moving coil and moving iron, voltmeter and ammeter, Dynamometer type wattmeter, ohm meter, megger, induction type energy meter, their connection and application for measurement.

Electrical Appliances : Construction, principles, connection, common faults their causes and testing of the following equipments, Electric room heater, electric iron, electric stove, geyser, electric kettle, electric fans, (ceiling and table fan).

House Wiring : Cleat wiring, casing and capping wiring, batton wiring, conduit wiring and PVC wiring, controlling of

lamps from two of three places. Schematic diagram of service connection.

Testing and connection of domestic wiring installation, Wiring faults and rectification, Installation of plate and pipe earthing, Procedure for measurement of earth resistance.

Electrical Drawing : Symbols used for common electrical equipments/appliances, Simple schematic and wiring - diagrams.

Mechanical Engineering :

MECHANICAL CRAFTSMANSHIP TRADE:

Basic manufacturing processes like casting, forming welding and metal cutting, various casting processes, sand casting, die casting, centrifugal casting. Gating and risering casting defects, melting furnaces.

Forging hammers and presses and various forging operations like upsetting, drawing, stamping etc. stock calculations. Various welding processes and equipments, Arc welding, gas welding, electrode specification and IS codes, Arc characteristics, TIG, MTG welding, soldering and brazing various machine tools like lathe, milling, shaping, drilling, machines, simple calculations, Various operations like turning, facing, threading, knurling, groove cutting etc., Material for machine tool components and cutting tools, coolants, taper turning and thread cutting calculations, Key way cutting on milling m/c.

AUTOMOBILE TECHNOLOGY TRADE :

Different types of automobiles, type of IC engines and their components, Auto cycle and diesel cycle, IHP, BHP and FHP and their calculations, cooling system, lubrication system, differential, transmission system, braking system and lighting system, Two stroke/four stroke engines, valve timing diagrams, carburetor and injector repair of automobiles, denting, patching, filling, finishing trouble shooting and remedial measures , servicing of a vehicle, repairs, cost estimation, functions of gear box of scooter, car or truck, working of dynamo, fuel pumps, function of clutches used in Indian cars, motor cycles or scooters, Bleeding of fuel system of diesel engines, engine tuning, steering mechanism, wheels and tyres and their repairs.

REFRIGERATION & AIR CONDITIONING TRADE:

Refrigeration systems, Air cycle refrigeration, vapor compression cycle, deviation of actual cycle from the theoretical cycle, study of charts and tables for refrigerants. Refrigeration of refrigeration processes on temperature - entropy and pressure - enthalpy diagrams. Absorption - compressor, evaporator, pumps, valves. Object of air conditioning, humidification and dehumidification, drying, evaporative cooling, comfort charts, year round air conditioning, air conditioning of cold storage, auditorium, aircrafts, locomotives. Sensible and latent heat, head load calculation, Psychrometry, use of psychrometric chart, air distribution and Ventilation systems, Types of fans and their ratings and mountings.

STRUCTURE AND FABRICATION TECHNOLOGY TRADE:

Strain stress Analysis : Simple stresses and strains : Normal and shear stresses, hook's law, Elastic limits, Ultimate strength, Breaking stress, factor of safety, lateral strain, Poisson's ratio.

Bending moment and shear force (Simple Treatment) : Introduction to types of loading, Concept of bending moment and shearing force, Concept of B.M. and SF diagrams, Examples of simple types of loadings on simply supported and cantilever beams.

Bending Stresses : Concept of bending stresses, neutral axis, moment of inertia of sections, strength of sections (only standard sections).

Tool Materials and Heat Treatment of Steel : Introduction to plain carbon tool steels and Alloyed tool steels, Applications, Concept of critical temperatures, Heat treatment processes - Annealing, Hardening, Tempering, Normalizing, Case Hardening, Types of furnaces (Introductory), Quenching media.

Metal Sawing and Cutting Equipment : Description of metal sawing machines, Power saw blades, Description of punching and shearing machines and their applications, nibbling machine etc.

Mechanical Working of Metals : Introduction to cold working and hot working. Introduction to spinning, drawing, stamping, beading, embossing, pressing, punching, rolling Extrusion processes.

Metal Joining Processes : Introduction of Riveting, Types of Rivets, Methods of Rivetting, Types of Rivetted Joints, Introduction to soldering brazing, Types of Joints for welding, Shielded Metal arc welding, Tig, Mig welding, Resistance welding process, Inert Gas arc welding, Submerged arc welding - Applications, Inspection of welded joints, Gas cutting, welding of cast iron by gas welding and arc welding, welding of Aluminum, Aluminum alloys, stainless steel. Cost estimation of welded work.

Pipes and Pipe Joints : Classification of pipes according to materials used and field of application, Types of pipe fittings, Cutting, threading and jointing of pipes, Laying of pipelines.

Metal Cutting Processes : Introduction to different metal cutting processes, Comparative study of following machine tools for machining operations (only specifications, relative advantages and suitability of each machine tools for different manufacturing processes). Lathe, Shaper, Planer, Slotter, Milling machine, Broaching machine, Forging machine, Grinding machines. Introduction to different types of cutting tools (Types of chips, speed, feeds and depth of cut, cutting fluids).

Surface Finish : Primary texture, secondary texture, Errors of forms, Designation of surface roughness as per BIS specifications.

Fits and Tolerance : Concept of interchangeability, limits of size, basic size, Tolerance, Tolerance Zone, System of Tolerances, Introduction to fits, Types of fits, BIS specifications.

Jigs and Fixtures : Function of Jig and Fixture, Types of Jigs, Types of Fixtures, Example of

simple jigs and fixtures and their use in structural fabrication.

Measuring Instruments : Standard of measurement, Study of Vernier calliper, outside and inside micrometers, Vernier Depth Gauge, Combination set, Dial Indicator, Limit Gauges, Screw Pitch Gauges, feeler gauges.

Quality Control : Concept of Probability, sampling inspections and inspection by attributes. Introduction to statistical quality control, normal distribution, standard deviation, Process capability.

Costing and Estimation : Difference between estimating and costing. Importance of estimation and costing, Importance of realistic estimates, Elements of cost, Fixed cost and variable cost, Depreciation, Calculation of machine time for turning, screw cutting, shaping, Standard time and its computation.

III. For 10+2 Vocational or NERIST certificate (Forestry) seeking admission to Degree Module in Forestry.

Full Marks : 150 Time:3 Hours

Section-A

A-1 Physics	20 marks
A-2 Chemistry	20 marks
A-3 Biology	30 marks

Section-B

B-1 Common Biological Science **30 marks**

B-2 Vocational (Forestry/Horticulture) **50 marks**

Section-A-1 Physics **20 marks**

Section-A-2 Chemistry **20 marks**

(Syllabi for Section A-1, Physics & Section A-2, Chemistry are same as given above for 10+2 vocational/NERIST certificate (Engineering and Technology))

Section A-3 Biology 30 marks
(For admission to Degree Module in (Forestry)).

Principles of Life Sciences : Introduction and objective of binomial nomenclature. Eukaryotic Cells, cell division, cell

biology, structure and function of cell organelles. Tools and techniques in cytological studies. Genetics, Mendel's law of inheritance, linkage and crossing over, chromosomal abnormalities, sex-linked inheritance. Genetics and society, public health and disease and preventive measures.

Botany : Classification of plant kingdom. Anatomy, (tissue system, secondary growth in stem and root), morphology, physiology concept of totipotency, water-relations, ascent of sap, photosynthesis, transpiration, respiration, turgor and turgor movement, seed dormancy, and embryology (pollination, fertilization and seed dispersal) of flowering plants. Insectivorous plants.

Entomology and Plant Protection : Fundamentals and principles of entomology, useful insects and their economic importance with special emphasis on apiculture, sericulture and lac insects. Insects harmful to plants, their mode of action and control measures.

Environmental Science : Definition and scope of ecology and environmental science, Structure and function of ecosystem, Environmental pollution and its impacts on ecosystem

Section B-1.

Common Biological Science 30 marks

(Common for 10 + 2 Vocational and NERIST Certificate holders in Forestry/ Horticulture seeking admission to Degree Module in Forestry).

Origin of Life : Prokaryotes and Eucaryotes, Biodiversity.

Structure and Function of Plants and Animals : Morphology, Cell biology and genetics of plants and animals. Physiology and reproduction of plants and animals. Ecology and adaptation of plants and Animals.

Section B-2 Vocational Subject

Forestry/ Horticulture 50 Marks

(For 10+2 Vocational and NERIST Certificate holders in Forestry seeking admission to Degree Module in Forestry)

Forest and Trees : Classification of forest vegetation, forest components, structure and function of trees.

Habitat Factors : Climatic, Topographic, Edaphic and biotic factors.

Forest and Tree Regeneration : Types of regeneration - natural and artificial, tending operations.

Plant Nutrition : Essential elements for plant growth, manures and fertilizers.

Management of Ornamental and Forest Crops : Asexual and sexual propagation of crops, nursery management.

Concepts of Agroforestry and Social

Forestry : Scope and objectives, types of agroforestry systems, people's participation in social forestry.

Economic Importance of Forest Products : Important timber yielding plants, minor forest produce - charcoal, bark, root, fire wood etc.

Wildlife : Laws and Acts, conservation and management.

Tree Biomass and Its Estimation : Tree growth and development, Estimation of biomass and productivity. Forest measurement - different devices.

SYLLABI FOR NEE-III

SECTION-'A'

PHYSICS

25 MARKS

Units: Fundamental & derived units with particular reference to S.I. units-illustrations. Explanation of dimensions with examples.

Basics Mechanics: Explanation of vector and scalar quantities with examples. Displacement as vector

quality. Concepts of instantaneous velocity, acceleration. Equations of motion. Definition and explanation of Laws of motion, force, mass and weight with mathematical expressions, Universal Laws of gravitation and Projectile motion. Explanation of circular motion, Satellite motion in an orbit : Kepler's Laws, escape velocity. Rigid body motion, moment of inertia, angular momentum, torque, Centre of mass, conservation of angular momentum. Simple harmonic motion and its geometric representation. Derivation of its equation. Concepts of amplitude, Oscillation, time period, frequency and phase with their mathematical expressions. Definition and explanation of work, power and energy with mathematical relation. Problems involving potential and kinetic energies and conservation of energy. Conservative and non-conservative forces. Static and Dynamic friction.

Properties of Solids: Definition and explanation of strain, stress, elastic limit, ultimate strength, Hooke's Law and Young's modulus. Compression bending, twisting and shear. Elastic moduli and their relations, Poisson's ratio. Concepts and examples of properties e.g. hardness, malleability, ductility, brittleness, toughness abrasion resistance, fatigue.

Properties of Liquids : Thrust of a liquid and pressure. Pressure at different depths. Pascal's Law and Hydraulic press. Buoyancy. Archimedes's Principle: definition and explanation with illustration surface tension, viscosity, fluidity and volatility.

Properties of Gaseous Materials: Boyle's Law and Charles Law-problems, kinetic theory of gases, Derivation of expression of pressure, temperature & Mean energy, Gas Laws and their derivation by kinetic theory. Absolute scale of temperature. Atmosphere and atmospheric pressure. Pressure and height. Measurement of pressure. Heat and temperature, Construction of mercury thermometers. Measurement, measuring scales and devices.

Definition and explanation of linear expansion. Area and volume expansion with mathematical relation.

Expansion of gas at constant temperature and at constant pressure. Ideal gas equation.

Measurement of heat specific heat capacity, relation between C_p and C_v , Isothermal and adiabatic process. Explanation of change of state of matter with change of temperature. Definition of latent heat of fusion and vaporization and numerical examples.

Transfer of heat, Explanation and examples of conduction, Convection and radiation processes. Thermal conductivity. Idea of black body radiation. Stefan Boltzman Law. Energy Equivalence of work and heat.

Explanation of first and second laws of Thermodynamics with examples.

SOUND : Wave motion, Concept of longitudinal and transverse waves; Definition of period, frequency, wave length, amplitude and phase; Speed of sound wave; Medium of wave propagation; Dopplet effect.

Properties of sound waves, Reflection, Refraction and Superposition of waves, stationary waves, beats, Vibration of Strings and Air columns, concept of resonance; Echo, Reverberation.

LIGHT : Explanation of light wave, wave front, ray, velocity of light.

Laws of reflection, reflection in different types of mirrors(plane, spherical, cylindrical, parabolic) with their geometrical drawing. Definition of image, focal length, radius of curvature, magnification with formula, numerical examples and application.

Laws of refraction, refractive index, total internal reflection, concave and convex lenses and image formation through them, formula connecting object and image, application in telescopes, microscopes, theodolite etc., refraction through prism.

Elementary ideas of electromagnetic waves. Wave nature of light. Young's double slit experiment and Fringe width. Single slit diffraction.

POLARISATION : Explanation of the polarisation of light analyzer and polariser.

MAGNETISM: Introduction to magnetism, magnetic field, lines of forces, earth's magnetism.

ELECTO-STATICS : Explanation of charge on the basis of electron theory, charging by friction, force between electric charges, concept of unit charge, electric field and electric potential p.d. and its measurement, definition of capacitance of parallel plate capacitor, capacitors in series and parallel. Dielectric constant.

CURRENT AND ELECTRICITY: Definition of emf, potential difference and current with illustrations. Basic direct current circuits: Units of current, resistance and conductance, Ohm's Law and solution of simple problems, effect of temperature on resistance. Series and parallel connections of resistors. Kirchoffs's rules, their applications and examples.

MAGNETIC PROPERTIES OF MATERIALS

Type of magnetic substances, magnetic flux, flux density, relative permeability, magnetic properties of soft iron and steel.

ELECTROMAGNETISM: Nature of magnetic field due to a straight conductor, a circular conductor and a solenoid, Fleming's left hand and right hand rule, Effect of current flowing through two parallel conductors, Bioat Savart Law.

Electromagnetic induction: e. m. f. induced in a coil by magnet, Faradays's law of induction, Calculation of e.m.f., Direction of induced e .m .f. Lenz's Law, Explanation of eddy current and explanation of self and Mutual induction, Calculation of self and mutual inductance.

Generation of alternating e.m.f.
Concept of reactance : Capacitive and inductive Impedance. Simple a.c. circuits analysis.

MODERN PHYSICS: Photoelectric effect, structure of atom, atoms and molecules, intermolecular forces, chemical bonding. Crystal structure with simple examples.

Radio-activity. Explanation of fission and fusion processes.

Thermionic emission and its applications, working principle of diode and triode valve, concepts of rectification and amplification.

SEMICONDUCTORS: Properties and basic principles, p and n types, Action of transistors.

SECTION-‘B’

CHEMISTRY

25 MARKS

PHYSICAL CHEMISTRY

States of Matter:

Gaseous State : Postulates of kinetic theory of gases; derivation of kinetic equation; derivation of ideal Gas Equation. Liquefaction, liquefaction by the use of volatile refrigerants and by adiabatic expansion.

Solid State: structure of solid unit cell fcc, bcc, ccp structure of solids.

Solution and Colligative Properties:

Concentration of solutions: Mass percent, mass fraction, mole fraction, Molality, Normality, Molarity, Formality,

Dilute Solutions : Raoult’s law, its statement and explanation; ideal and non-ideal solutions; Colligative properties; Relative Lowering of vapour pressure elevation in boiling point, Depression in freezing point, molal elevation and molal depression constants, Osmotic pressure definition and method of measurement;

Determination of molecular masses based on colligative properties; Van’t Hoff’s theory of dilute solutions.

Colloids : Definition, classification and preparation of colloids; Properties of colloidal state; Tyndall effect, electrophoresis, Brownian movement; protective colloids.

Thermodynamics & thermochemistry : First law of thermodynamics mathematical formulation of the law, Isothermal and adiabatic changes; Relation between heat capacities at constant pressure and constant volume; $C_p - C_v = R$

Second law of thermodynamics: Carnot’s cycle derivation of an expression for efficiency of a reversible engine, Concept and physical signification of entropy.

Free energy and work function-relation between the two; free energy change and chemical affinity. Thermochemistry, Heat of reaction(s). Hess’s Law of constant heat summation.

Kinetics and Chemical Equilibrium : Rate of reaction; law of mass action, velocity constant; reversible reactions and chemical equilibrium, equilibrium constant(;) application of law of mass action to the dissociation of hydroiodic acid.

Le Chatelier’s principle (statement, explanation and its industrial applications (for NH_3 H_2SO_4))

Order of reaction: first and second order of reactions, relation between rate of reaction and velocity constant. Simple problems.

Electrochemistry : Modern Ionic theory; Modern ideas on acids and bases; Strength of acids and bases; Dissociation of water-Ionic product for water, hydrogen-ion concentration and pH

Common-ion effect and solubility product-their applications in inorganic analysis and indicators.

INORGANIC CHEMISTRY

Atomic Structure and Chemical Bondings.

Electrons, protons and neutrons-their charges and relative masses. The early models of the atom, Rutherford's model, Hydrogen spectra, Failure of Rutherford's model. Bohr's model of hydrogen and hydrogen like atoms, Sommerfeld model, Dual nature of particle and radiation, de-Broglie equation, uncertainty principle. Preliminary introduction of wave mechanical model of an atom and concept of atomic orbitals, Quantum number (only mention of quantum numbers and its application to electronic structure of atoms). Aufbau principle, Pauli's exclusion principle and Hund's rule.

Ionic Bonds: Definition, factors influencing the formation of ionic compounds, Lattice energy of ionic compounds.

Covalent Bonds : Nature of covalent bond (Lewis concept), concept of orbital overlap in bond formation, sigma and pi bonds, hybridization of atomic orbitals (sp, sp^2, sp^3 hybridization), properties of covalent compounds, structure of simple molecules like $H_2O, NH_3, CH_4, SO_2, C_2H_4$ and C_2H_2 .

Co-ordinate covalent bonds : Lewis concept, structure of H_3O^+ and NH_4^+ ion on the basis of hybridization, properties of co-ordinate covalent compounds.

Metallic bonds : Characteristics of metals, arrangement of atoms in metals (crystal structure). Bonding in metals (elementary treatment only), insulators, conductors and semi-conductors, extrinsic semi-conductors (n-type and p-type semiconductors) **Hydrogen bond :** Conditions necessary for the formation of hydrogen bond, nature of hydrogen bond, intermolecular hydrogen bonding, consequences of hydrogen bonding, Vander Waal's forces.

Periodic Table and Periodic Properties of Elements: Mendeleev's periodic table and periodic law; Long form of periodic table, its merits and demerits. General characteristics; Properties of s-block, p-block and d-block (variable oxidation states, formation of complexes and coloured compounds, magnetic properties). The trend of periodic properties such as atomic volume, atomic radii, ionization potential, electron affinity and electronegativity in periodic table (qualitative treatment only). Factors affecting periodic properties. **s-Block elements:** General properties of alkali and alkaline earth metals, nature of their oxides, halides, hydroxides, carbonates, bicarbonates and nitrates. **p-Block elements:** Electronic configuration and general properties of Boron, Carbon, Nitrogen, Oxygen and Halogen family and Noble gases. Their oxidation state and nature of oxides, halides and hydrides.

Metallurgy: General principles of extraction of metals; occurrence of metals; sources of different metals; explanation of the terms: gangue and ore, flux, slag, smelting, electro-refining and refining of metals by liquation. General method of extraction of metals by pyro-metallurgical process and by electrolysis (different principles only).

Ferrous metallurgy: Ores of iron, manufacture of pig iron, cast iron and wrought iron.

Manufacture of steel by Bessemer, Open hearth, Duplex and L.D. processes. Properties of cast iron, wrought iron, steel; effects of carbon, silicon, phosphorous, sulphur, manganese on iron and steel.

Non-ferrous metallurgy : Ores of aluminium properties of aluminium and its uses. Ores of copper, properties of copper and its uses.

Ores, properties and uses of Lead, Zinc, Tin and Chromium.

Alloys: Effects of carbon and other alloying elements on the properties of steel. Composition and uses of the following alloys-Brass, Bronze, German silver, Bell metal, Gun metal, Duralumin, Nanganin, Type metal, Nichrome and Solder.

Simple Chemical Calculation:

Calculation relating weight and weight.
 Calculation relating weight and volume
 . Study of some Important Chemicals:
 Ammonia-preparation, properties and uses;
 Nitric acid-preparation, properties and uses.
 Sulphuric acid-preparation, properties and uses;
 Hydrochloric acid-preparation, properties and uses.
 Liquefaction of oxygen.

ORGANIC CHEMISTRY.**Introduction, classification and nomenclature of organic compounds.**

Hydrocarbons: Saturated and unsaturated aliphatic hydrocarbons. Preparation and properties with special reference to methane, ethane, ethylene, acetylene, aromatic hydrocarbons, preparation and properties of benzene, structure of benzene.

Alkyl and Arylhalides: Preparation, properties and uses of polyhalogen derivatives such as CHCl_3 , CHI_3 , DDT.

Compounds with functional group containing oxygen: Alcohols and phenols, aldehydes and ketones, carboxylic acids and acid derivatives, (General methods of preparation, properties)

Compounds with functional group containing nitrogen : Nitrocompounds and amines (preparation and properties).

INDUSTRIAL CHEMISTRY

Plastics & Polymer: Definition of a polymer ; functionality; polymerization. Addition and condensation polymerization. Thermoplastic and thermosetting resin nature of monomer, structure (1) properties and uses, Plastics definition, names, properties and uses.

Fuels : Definition of fuels, classification of fuels with example; availability of different fuels in India ; combustion, calorific value (gross and net).

Solid Fuels: ignition point, spontaneous combustion of coal, storage of coal, destructive distillation of coal and carbonization of coal (principles, outline of the description, by-products-H.T.C. and L.T.C. destructive distillation of wood (names of different products only).

Liquid fuels: sources, fractional distillation (only names of different fraction, description of the operation not necessary) ; boiling ranges and uses of different fraction, properties of liquid fuels –flash point, power point, viscosity, specific gravity, carbon residue, and octane number knocking.

Gaseous fuel: names of different commercial gaseous fuels with their composition, calorific value; manufacture of producer gas and water gas (principles with physico-chemical reactions only).

Water : Hard and soft water, boiler feed water, scale formation, priming and foaming, caustic embrittlement, water softening methods, treatment of water for town supply and sewage disposal.

Corrosion and its protection: Definition, theories of corrosion, factors affecting rate of corrosion , rusting of ferrous metal, demerits of corrosion, prevention of corrosion by various methods.

Environmental Pollution : Air and water pollution : causes and remedy.

QUALITATIVE ANALYSIS.

Inorganic Qualitative Analysis: Dry test and wet test for simple anions and cations. Principles involving separation of groups, analysis of mixture containing four radicals.

Organic Qualitative Analysis : Elements analysis, Qualitative test for functional groups containing oxygen and nitrogen.

SECTION-‘C’

MATHEMATICS 25 MARKS

Arithmetic, Geometric and Harmonic Progression. Permutation and Combination. Binomial expansion for positive index, middle term, greatest term, binomial expansion for general index. Complex number. Algebra of complex number, modulus, argument and conjugate of complex number, cube root of unity. Determinants upto third order, their properties and application to solve linear equations (Cramer's rule). Trigonometric ratios of compound, multiple and sub-multiple angles, trigonometric equations and identities, height and distance, properties and solution of triangles, inverse trigonometric functions. Points and their coordinates on a plane, distance between points, area of a triangle, division of a segment in a given ratio, equation to a line, angle between lines, distance from line, pair of lines, circle tangents and normal to a circle. Simple problems on parabola, hyperbola and ellipse.

Application of Derivative: Increasing and decreasing functions, maxima and minima, tangent and normal, curvature and derivative of arc.

Integration, integration by substitution, integration by parts, integration of trigonometric and algebraic function, definite integration, area bounded by curves, length of arc and volume of surface revolution,

Points and co-ordinates on 3-dimensional space. Distance between points, direction cosines, direction ratios, projections, equation to a plane, angle between planes, distance of a point from a plane, line angle between lines and planes, coplanarity and distance from a line.

Data and their representation, mean, mode median, variance.

SECTION- D

2.1 AGRICULTURAL ENGINEERING : 75 MARKS

General Engineering Science: Laws of thermodynamics Zeroth law, first law, second law. Concept of enthalpy, internal energy, entropy and absolute temperature. Properties of pure substances and mixtures, reversibility and irreversibility. Thermodynamic cycles, Carnot cycle and steam power cycles, otto, diesel and dual cycles.

Equivalent forces at a point, simplest resultants in two and three dimensions, equations of equilibrium, free body diagrams and reactions. Two dimensional frames and trusses. Principle of virtual work, friction forces. Belt, rope and chain drive and power screws. Centroids, mass centers, second moment and product of inertia of plane area. Velocity, acceleration, rectilinear, curvilinear co-ordinate system and relative motion, particle dynamics, equation of motion.

Concept of stress and strain, normal and shearing stresses and strains. Stress-strain diagrams for uniaxial loading. Deformation of axially loaded members, torsion of circular shafts. Stress and deflections in closed coiled helical springs subjected to flexural loads. Reactions for statically determinate beams, relationships between load, shearing force and bending moment, shear force and bending moment diagrams. Theory of simple bending stresses, shearing stresses in beams, principal stresses and principal planes, principal strains, principal stresses in 3 D, relation between elastic constants, combined torsion and bending, pressure vessels, biaxial stresses, yield theories, deflection of beams.

Properties of fluids. Pressure and its measurement. Hydrostatic forces on surface. Kinematics and dynamics of fluid flow. Dimensional analysis and similitude. Laminar and turbulent flow in pipes, general equation for head loss, energy loss through pipe fittings.

Measurement of distance and areas. Principle and methods of chain surveying, prismatic compass and chain traversing. Theodolite traversing. Plane table surveying including two point and three point problems. Leveling and contouring, measurement of areas and volumes.

Engineering properties of granular materials, soil classifications, fundamental definitions and relationships. Determination of index properties of soil. Permeability and seepage analysis. Stress distribution. Shear strength. Mohr's circle of

stresses. Compaction. Active and passive earth pressures. Stability analysis of earthen slopes.

Farm Power and Machinery: Salient features of various source of farm power used in India, Farm engine, tractors and power tillers, their selection, operation and adjustment. Principles of working and construction of I.C. engine. Engine valves and operating mechanism, fuel and combustion. Different systems of I.C. engine such as fuel, lubrication, cooling, intake, exhaust etc. Study of clutch, brake, gearbox, differential, final drive hydraulic and electrical system of farm tractors. Use of electrical motors as a source of farm power.

Scope, need and constraints of mechanization. Types of implements, field capacities, constructional details, design criteria and principals of operations of different types of hand tools. Animal, power tiller and tractor operated primary and secondary tillage implements such as indigenous plough, mould board plough, disk plough, rototillers, harrow, cultivator, subsoiler, leveler etc. Types principles and constructional details of weeder, seed and fertilizer drill, planters, transplanters, sprayer, duster, mower, vertical conveyor reaper, threshers and combine harvesters.

Soil and Water Conservation Engineering: Water resources utilization in India. Ground water resources development and utilization, Hydraulics of wells, open well and tube well design and construction. Water lifts and irrigation pumps. Measurement of irrigation water. Water conveyance and its control. Irrigation efficiencies, irrigation scheduling. Design of irrigation channel and seepage analysis. Design of underground pipelines. Soil-plant-water relationships. Land grading and field layout for efficient irrigation. Introductory concept of farm irrigation methods: border, check basin, furrow, sprinkler and drip. Drainage: importance, problems, types and requirements in agriculture, drainage coefficient, dynamics of soil-water, measurement of soil permeability, field drainage layout patterns.

Hydrology: Hydrologic cycle, precipitation, infiltration, evaporation, runoff and its estimation and measurement. Types and mechanics of wind and water erosions, biological and engineering measures of controlling erosion, gully control and gully control structures. Vegetative waterways and their design, stream bank erosion and its control, design, construction and maintenance of farm ponds. Introduction to watershed management.

Post Harvest/Process, Food Engineering and Farm Structures: Engineering properties of biological materials: rheology of agricultural products. Mixing and mixers. Psychrometry; theory of grain drying, different types of grain dryers and dryer efficiency. Size-reduction and energy requirement, Kick's law and Rittingers, law, roller mill, burr mill and hammer mill. Storage of grains, lateral and vertical pressure relationship.

Importance of agricultural processing: process of cleaning, grading and sorting, and related equipments. Material handling equipments. Processing of cereals, pulses, oil seeds. Layout, maintenance and testing of related machinery and plant. By-products utilization; combustion, gasification and other chemical and bio chemical transformations.

Properties and classification of building material like bricks, lime, cement, sand, coarse aggregates, timber, asbestos, glass etc. Animal shelters and storage structures in fans.

2.2. CIVIL ENGINEERING:

75 MARKS

STRENGTH OF MATERIALS & THEORY OF STRUCTURES:

Stress-strain behaviour of mild steel, torsion of circular shafts, shear force and bending moment in determinate beams, Bending and shear stress, Principal stresses & Mohr's circle, slope and deflection of determinate beams by Double Integration method and moment area method, columns, Rolling loads and influence lines, cables and three hinged arches, Deflections by energy methods, Castigliano's theorems, Stability and Degree of indeterminacy.

WATER RESOURCES ENGINEERING:

Hydrology: rainfall, stream flow measurements, runoff, hydrographs, flood studies, reservoir and channel routing flood forecasting, flood protection measures, river training works, well hydraulics. Irrigation:

Command area, duty and delta, canal outlets, crop-water requirement.

FLUID MECHANICS.

Properties of liquid, fluid statics, flow classification, continuity equation, momentum equation and energy equation and their application, flow measurement, laminar and turbulent flow through pipes, pumps and turbines.

GEOTECHNICAL ENGINEERING:

Preliminary definitions & relationship, Determination of index properties, classification of soils, soil structure and clay mineralogy, permeability, Darcy's law, seepage analysis, compaction, one dimensional consolidation, Terzaghi's theory, shear strength, theoretical consideration and tests, shallow and deep foundations, soil exploration.

TRANSPORTATION ENGINEERING:

Pavement and their components, Highway geometric design, Horizontal and vertical alignment.

SURVEYING:

Contouring Theodolite and its adjustment, measurement of angles and setting out lines, trigonometrical leveling, Tacheometry, curves and different methods of setting out curves.

STRUCTURAL DESIGN :

Working stress methods of design, singly and doubly reinforced sections, rectangular and Tee beams, shear, torsion and development length, one and two way slabs, short and long column, Design of isolated footings, Introduction of limit state design, Design for flexure, shear and compression, Design of revted and selded connections, tension and compression members, splicing and lacing, Beam column connection, roof trusses.

ENVIRONMENTAL ENGINEERING:

Estimation of quantity of water, per capita demand, population forecasting, quality parameters, treatment of water, distribution

system, Estimation of quantity of sewage, dry weather flow and storm run off, sewer appurtenances, characteristics of sewage, treatment and disposal of sewage, sludge digestion.

2.3.COMPUTER SCIENCE AND ENGINEERING

75 MARKS

DIGITAL ELECTRONICS & ELEMENTS OF LOGIC DESIGN.

Number systems, Binary arithmetic. Boolean Algebra and logic functions, Minimization of Boolean function. Design of combinational circuits like adders, multiplexer, demultiplexer, decoder, parity generator and checker, comparator etc. Flip Flops, Registers and counters.

COMPUTER ARCHITECTURE AND ORGANIZATION.

Different section of computers CPU, ALU, memory and I/O units. Instruction formats. Data representation. Addressing mode. Processor Organization, Micro-instruction. Memory organization, virtual memory concepts. IOP, RISC, CISC, parallel processing.

PROGRAMMING LANGUAGE CONCEPTS.

Programming techniques in FORTRAN, C and C++, facility of various data types control structure, function call, pointer, file handling, abstract data type definition data encapsulation, inheritance, overloading, constructor, destructor.

DATA STRUCTURES:

Various data structures in computer application like arrays, matrices, linked lists, stacks, queues, trees, graphs. Representations of various data structures and their applications. Basic searching and sorting techniques.

APPLICATION SOFTWARE:

Feature of dBase-IV & Foxpro-commands, menu programming, report generation, file handling. Features of LOTUS-123; creation and manipulation of spreadsheets, use of mathematical & statistical function.

SYSTEM SOFTWARE/OPERATING SYSTEM:

Assemblers, process of translation, pass structure of an assembler. Macro definition of macros, macro calls, macro processing, subroutine

definition, subroutine calls, co-routine calls, loaders, linkers, editor. Usage of operating systems, Types of OS, Concept of process and CPU scheduling. Memory management, Paging, segmentation, virtual memory, demand paging, page replacement.

2.4. ELECTRONICS & COMMUNICATION ENGG. MARKS :75

ELECTRONIC DEVICES AND CIRCUITS:

Analog Devices & circuits:

Physics of Semiconductor Materials & Components, Energy band diagram, Fermilevel, Hall effects.

Devices: Diodes, BJT,s FET,s, Thristors, Tunnel diodes, Basics of IC,s and operational amplifiers.

Circuits: Biasing circuits of transistors, Design of power supplies using Diodes and transistors-voltage Regulator Circuits Transistor Amplifier (BJT & FET), Power amplifiers, feedback amplifiers, oscillators (qualitative analysis only). Multivibrators, Time base circuits. Regulated Power supply.

Time base circuit-Saw-tooth voltage and current generators, transistor switches, wave shaping circuit

(diode & transistors)Electro-static and magnetic deflection methods, low frequency h-parameter transistor & FET models, Pi models.

DIGITAL DEVICES AND CIRCUITS:

Number systems: logic gates-Boolean Algebra-Transistor as a switch-logic families-Arithmetic and logic circuits-Counters and shift registers-A/D and D/A converters, Multiplexer, Demultiplexer, Encoder, Decoder.

Microprocessors: Architecture-Assembly language programming of 8085-peripheral devices-Interfacing of memory and devices.

Semi Conductor Memories: RAM, ROM, Storage devices , printer, Connectors,

floppy drives, Organization of computer, simple programme.

ELECTRONIC INSTRUMENTATION AND MEASUREMENTS:

Systems, units and standards of Measurement, AC and DC indicating instruments, AC and DC bridge circuits, Error Analysis of a generalized measurement systems, transducers (Strain gauge, LVDT. Thermistor, Thermocouple etc.) Electronic Measuring Instruments, CRO, Digital Ammeter, Millimeter, Voltmeter, Time and Frequency measurements, Signal Generators, Q-meter, Wattmeter, Energy meter.

NETEORKS-FILTERS AND MICROWAVE ENGINEERING.

Network theorems, Single and Two port networks, T-type, II-type ladder type networks. Transmission lines: Characteristics impedances, Attenuators, Equalizers, Basics of wave guides-Transmission line charts.

Filters: type, simple design problems, Basics of Electromagnetic theory , Maxwell's equations. Basics principles of wave propagation. Fundamentals of Antennas and Radar, Basics of Microwaves, EM Spectrum Principles of microwaves devices and circuits.

COMMUNICATION ENGINEERING:

Introduction to signal analysis-Fourier series and Fourier transform. Sampling theorem, Parsevals theorem, convolution, Transmission through linear systems: AM,FM PM, Pulse modulation; PCM: Amplitude limiting in FM, Pre-emphasis, Deemphasis; Noise in AM and FM: Multiplexing-FDM, TDM; ASK, FSK, Block schematic of different transmitters for AM, FM,SSB, ISB systems; Superhetrodyne receivers, Mixers, AGC, AFC, spectrum of EM waves; Propagation of EM waves-sky waves- sky wave, ground wave, space wave, skip distance, maximum usable frequency; Antenna fundamentals and Radiation; Communication systems; Principles of telegraphy, telephony and television broadcasting , Basics of satellite and optical fibre communications: Fundamentals of telematics.

2.5. ELECTRICAL ENGINEERING 75 MARKS

ELECTRICAL CIRCUIT: Phasors and computation in phasor algebra, balanced

resonance: and unbalanced polyphase circuits. Star-delta transformation, Network theorems, Parameters of electromagnetic circuit.

ELECTICAL ENGINEERING MATERIALS:

Conducting materials, Magnetic materials, Insulating materials, Properties & applications.

ELECTRICAL INSTRUMENTS AND MEASUREMENTS:

Principles of Measurements: Classification, accuracy, and sensitivity, damping and control forces, shunt and multiplier. Measurement of resistance: Low, medium and high. Principles and use of DC potentiometers, AC Bridges,. Indicating instruments: Multimeter, PF meters, frequency meters, synchroscope .

ELECTRICAL MACHINE:

Classification of D.C. machines: Constructional features, e.m.f., torque, excitations, motor performance, speed, power, size considerations, speed control, efficiency.

Transformers: Induced e.m.f., equivalent circuits, regulation, different efficiencies.

Three phase induction Machine: Torque characteristics, Starting, Equivalent Circuits.

Three phase synchronous machines: generation, voltage regulation, parallel operation, synchronous motor, starting and V-curves. Single phase motors: type, starting characteristics.

GENERATION, TRANSMISSION AND DISTRIBUTION :

Generation: Prime movers and alternators.

Transmission: Voltage levels, line conductors, electrical line parameters of short lines, voltage regulation, corona.

Distribution: DC and AC systems, voltage level, type of distribution feeders and distributors voltage drop and effects, power factor improvement plant;

Substation: Different types, site selection, equipments, Electrical earthing.

Switchgear: Switch, isolators, circuit breakers type.

Protection: Fault currents and protective devices, Fuses, Relays functions, alternator, transformer protection, thermal relays, over voltage-causes, effect and protective devices.

ELECTRICAL ESTIMATION AND COSTING:

Estimation of materials at installation of building. UPS and small diesel generating-set, cost and accessories.

Estimation of materials and cost for selection criteria, Design and calculation of the cost of 400V/230V three phase 4 wire, 100-500 KW overhead line, Tender.

ELECTRICAL POWER UTILIZATION: Design of lighting system.

Electrical heating: Resistance heating, induction heating, Arc heating and Dielectric heating.

Electrochemical process: Principle equipment and procedure.

Electric Drives: Characteristics of various electric drives, speed control, mechanical consideration, selection of motors.

POWER ELECTRONICS: Power diodes and Darlington pair:

Thyristor: Principle, thyristor family, triggering communication and SCR, firing circuits application,

Selenium rectifiers, uncontrolled and controlled rectification.

DIGITAL ELECTRONICS:

Digital signals, gates, Boolean algebra, logic families, multiplexure/ demultiplexure, Encoders/decoders, flip flops, registers, counters and applications of logic gates.

COMPUTER PROGRAMMING:

Concept of low level and high level languages, Block-diagram, concept of flow chart, and algorithm, Assemblers, Macros, sub-routines, co-routines, loaders, linkers, editors and compilers, programming and file handling in C and C++.

2.6.MECHANICAL ENGINEERING

75 MARKS

ENGINEERING MECHANICS & STRENGTH OF MATERIALS:

Introduction to force systems, vector concepts, rests & motion, Newton's law of motion and derived concepts, friction, mechanics of clutch, Centroid, area &

mass, moment of inertia., Work-energy principle, impulse, plane motion of particles and applications, static analysis of simple structures, Virtual work, combined motion of rotation & transmission of power by belt and gear drives.

Stress & strain in tension, compression, shear stresses, principal stress and strain, Mohr's circle for stress and strain analysis, shear forces and bending moment diagram, thin cylinders under internal pressure, hoop stress and strain stress analysis of riveted and welded joints, deflection of beams, Cantilever, Columns, Struts, stress & strain analysis of shafts under torsion, analysis of strings.

ENGINEERING MATERIALS:

Mechanical, thermal, chemical and manufacturing properties, structure of materials, alloys. Iron and its alloys, Iron Carbon phase diagrams, steel and other important alloys of iron, Heat treatment processes, Elastic & plastic behaviour, plastic deformation. Effect of various alloying elements on mechanical properties of Iron.

DESIGN OF MACHINE ELEMENTS:

shafts and keys, joints, couplings, mechanics of gears, introduction of bearing and lubrication.

HYDRAULICS & HYDRAULIC MACHINES:

Properties of liquid, hydraulic pressure and its measurement, flow of liquids, steady, unsteady, laminar and turbulent flows, continuity equation, momentum equation and energy equation and their applications, Orifice, mouth piece and nozzles, flow through pipes, fundamentals of channel flow, flow measurements: Different types of pump, reciprocating and rotary pumps, operation and maintenance of pumps, Characteristic curves of pumps, efficiency of pumps. Compressors, blowers and fans, dimensional analysis, stream function and velocity potential, rotational and irrotational flow, circulation, vortex flow. Different types of turbine, Francis, Kaplan and Pelton turbines, operation and

maintenance of turbines, characteristic curves, work done and efficiency of turbine, hydraulic machinery like hydraulic ram, hydraulic coupling and torque converter, hydraulic jack etc.

THERMAL ENGINEERING: Laws of thermodynamics: Zeroth law, first and second law, concept of internal energy, enthalpy, entropy and absolute temperature, Clausius inequality, concept of availability. Maxwell's relations, thermodynamic cycles, Carnot cycle, Rankine cycle, Otto and Diesel cycles, Applications of thermodynamic laws, reversibility & irreversibility, pure substances and mixtures.

Ideal gas compression and compressors, steam generators, jet propulsion, gas compressors, steam generators, Fuel and combustion, I.C. engine, calculation of efficiencies, Open and closed gas turbine cycles, introduction to heat and mass transfer, Principles of refrigeration, air refrigeration system, Vapour compression refrigeration system, refrigeration cycles, use of T-S & P-H charts for refrigeration, refrigerants and their properties, vapour absorption system, psychometric properties and charts, heat exchanger, LMTD and NTU methods, testing of I.C. engines, types of power plants, components of steam power plant, gas turbine, power plant, power hydel power plant, nuclear power plants.

PRODUCTION AND INDUSTRIAL ENGINEERING:

Fundamentals of metal cutting, tool geometry, calculations of cutting forces and tool life, General purpose machine tools and their operations, various welding techniques like arc, gas, resistance, Metal forming methods like rolling, drawing, extrusion, press working, power metallurgy, heat treatment of metals, Introduction to NC and CNC machines, Basics of measuring instruments, study of transducers, static & dynamic characteristics of instruments.

Introduction to metrology: Limits, fits & tolerance, Comparators:- mechanical & optical, measuring instruments for angles, measurements of surface roughness and thread profiles, calibration of various measuring instruments.

Basics principles of statistical quality control, general theory of control charts for variables and attributes, direction for simple X- and R-charts, Fundamental concepts in acceptance sampling

APPENDIX

<u>Branch in which admission is admissible</u>	<u>Allied Branches</u>
Agricultural Engineering	Agriculture Engineering; Agriculture Engineering & Farm Machinery; Agriculture Farm Engineering
Civil Engineering	Civil Engineering; Civil Engineering (Draughtsmanship); Civil Engineering (Construction Technology); Construction Technology; Building Construction; Public Health Engineering; Civil Engineering (Public Health Engineering); Water Resource Engineering; Civil Engineering (Management of Water Resources); Transportation Engineering; Rural Technology; Civil & Rural Engineering; Rural Engineering; Civil & Rural Technology
Computer Science & Engineering	Computer Technology; Computer Science; Computer Engineering ; Computer Sc. & Engineering; Computer Sc. & Technology; Computer Hardware Maintenance; Computer Science & Hardware Engineering; Special Diploma in Electronics (Computer); Information Technology
Electronics & Communication	Applied Electronics; Industrial Electronics; Special Diploma in Electronics (Industrial Electronics); Electronics Engineering; Electronics (Consumer); Electronic Equipment & Trouble Shooting; Consumer Electronics; Electronics & Micro processors; Micro-processors; Microprocessors & Microbased System; Electronics Communication System; Electronics Fiber Optics; Electronics Communication; Electronics & Electrical Communication; Special Diploma in Electronics (Communication) Telecommunication; Electronics & Communication Engineering; Telecommunication (Electronics & Telecommunication); Telecommunication Engg.; Telecommunication (Sound & Television); Electronics & Radio Engineering; Electronics & Radio Technology; Electronics, Television & Sound Engineering; Sound & Television Engg; Television & Video Engineering System; Audio & Video Engg.
Electrical Engineering	Electrical Engineering; Electrical Engineering & Electronics Control; Electrical Engineering with Industrial Control; Electrical Power System
Mechanical Engineering	Mechanical Engineering (Maintenance); Mechanical Engineering (SW); Fabrication Technology; Fabrication Engineering; Mechanical Engineering (Sheet Metal & Welding); Mechanical Engineering (Maintenance Engineering); Machine Tool Maintenance & Repair; Mechanical Engineering (Instrumentation), (Mechanical Engineering), (Tube Well Engineering); Thermal Engineering; Mechanical Engineering (Heat Power Engineering); Robotics; Mechanical Engineering (Design, Drawing & General); Mechanical Engineering (Machine Design & Drafting); Mechanical & Rural Engineering