

North Maharashtra University, Jalgaon

Revised Syllabus for First Year of Engineering

Common to all Branches

(with effect from 1998-99)

In connection with the change in syllabus & structure in faculty of Engineering.

Rules and Regulations relating to the admission and examinations of "FOUR YEAR

DEGREE COURSE" for the degree of Bachelor of Engineering in different branches of engineering.

1. The first degree in Engineering consisting of four years (Eight Terms) course shall be designated as Bachelor of Engineering (B. E.) in different branches of engineering.
2. Admission of students to all the college under the faculty of Engineering will be governed by the following regulations.
 - 2.1. The minimum qualification for admission to first semester shall be the passing of the Higher Secondary Certificate (Std. XII) Examination of the Maharashtra State Board of Secondary and Higher Secondary Education, Pune or its equivalent examination with Physics, Chemistry, Mathematics and English as the subjects with not less than 50 percent marks in the subjects of Physics, Chemistry and Mathematics taken together at one and the same sitting. (45 percent marks in the subjects of Physics, Chemistry and Mathematics taken together at one and the same sitting for Backward Class candidates for Maharashtra state only.)

OR

The candidate should have passed the Indian School Certificate (Std. XII.) Examination or any other equivalent Higher Secondary (Std. XII) Examination of Council or Board outside Maharashtra State with English, Physics, Chemistry and Mathematics subject and secured not less than 50 percent marks in the subjects of Physics, Chemistry and Mathematics taken together, at one and the same sitting. (45 percent marks in the subjects of Physics, Chemistry and Mathematics taken together at one and the same sitting for Backward Class, Candidates from outside Maharashtra State.)

- 2.2 For admission to the Third semester (Second Year) of four year degree course, the candidate should have passed in first class, diploma course in Engineering/Technology of the Board of Technical Examinations, Maharashtra State, Dr. Babasaheb Ambedkar Technology University, Lonere or any other institution which has been granted academic autonomy by the Government of Maharashtra or University in the State of Maharashtra.

OR

The Candidate should have passed in first class, diploma in Engineering / Technology recognised as equivalent to the diploma awarded by the Board of Technical Examination, Maharashtra State.

- 2.3 The eligible candidate as specified in above rules 2.1 and 2.2 will be admitted as per the rules and procedure laid down by Government of Maharashtra time to time for admission to Engineering Colleges in first and second year.
- 2.4 The admission against reserved quota from other states, if any, to be filled by nomination by the Maharashtra State Government may be made in accordance with the rules framed by State Govt. of Maharashtra in this regard from time to time.
- 2.5 A candidate who has passed AMIE by papers shall be considered to be eligible for admission to final B. E. Course in the appropriate branch of engineering.
- 2.6 Rules relating to improvement of class/percentage of marks for B.E. examinations be made. These rules shall come into force and become effective from the academic year 1998-99.

The accrual of the benefits under this rules could be availed of by the candidates who have passed the B.E. examinations of this university. The facility of these rules could be availed of by the candidates who have obtained the class mentioned in column I and who desire to improve their class/percentage of marks as shown in column II below; such eligible candidates will be permitted at their option to appear, again for the same examinations with the same subjects in both items of final year simultaneously or otherwise but within a period of three years from the date of his/her registration without being required to keep any terms with the tacit understanding, however, that they will appear for the courses that are being taught at the time of their registration.

Column I

Column II

a) Pass Class

a) Second Class or
At least 55% or first Class

b) Second Class

b) At least 55% or first Class

Such eligible candidates permitted to reappear, however will have to avail of the facility under these rules within a period of three years from the date of their registration for improvement of their class/percentage of marks. Furthermore, such a facility will be available to such eligible candidates till the teaching of the courses is available and only if the examinations for these courses are conducted according to the pattern existing thereto.

The candidates who desire to apply for improvement of class/percentage of marks should submit their application forms for improvement of class/percentage of marks colleges / Departments of the University / recognised Institutions through which they have obtained the original Degree :

If a candidate who reappears for B.E. Examination under the provision of these rules failed to improve his/her Class/ Percentage of marks, his/her Performance at such reappearance will be ignored.

If a candidate who reappears for B. E. Examination under the provision of these rules to improve his/her Class such reappearance, the original degree certificate and the original statement of marks that he has received, faculty will have to be surrendered, then new certificate and statement of marks shall be issued.

Note :

- i) The examinations for the improvement of class of the candidates will be held in/after every term.
- ii) The registration fee of Rs. 200/- for improvement of class/scheme/percentage of marks for different classes will have to be paid by the candidates, at the time of registration. This fee will be valid only for the period of three years.
- iii) The fees for improvement of class/percentage of marks for different classes will have to be paid by the candidates which will be double of the applicable examination fees for each attempt, prescribed by the university for those particular courses at the time of appearance.

2.7 The branch of engineering of a student may be changed in beginning of the second year (SE), if he/she desires so, as per G. R. No. PEC 3090/59083(6342) dated 1st August 1994, of Department of Higher and Technical Education, Maharashtra State and any other letter, issued on later date by this department in connection with transfer of branch or college and as per N.M.U. Rules.

2.8 If a student of a conducted college or affiliated college of any other university wants to seek admission at SE or TE or level of any branch of engineering, his/her application may be considered if he/she is eligible for admission at that level. Apart from normal eligibility condition of the university, such applicant's eligibility shall be also examined on the basis of the equivalence of courses and examinations. Equivalence of course and examination shall be examined by three senior teachers of the concerned branch of engineering and any two senior teachers of other branches of engineering. This committee shall be appointed in consultation with the Dean of faculty of engineering.

The course offered by the engineering faculty will be suitably divided in eight groups corresponding to eight terms, two terms in each academic year.

3.1 There shall be four theory papers in first term and five theory papers in second term of first year - FE. The total marks in I & II terms shall be as follows :

TERM :- I

			Total marks
Theory Papers	4 Nos.,	100 marks each	400 marks
Term Work	7Nos.,	25 marks each	175 marks
			575 marks

TERM :- II

Theory Papers	5 Nos.,	100 marks each	500 marks
Term work	7Nos.,	25 marks each	175 marks
			675 marks

Total marks of FE 1250

- 3.2 There shall be five theory papers and three practical sand / or examinations in each of the third to sixth term (Second and third year - SE, TE). The total marks in each term shall be as follows :

Theory papers	5 Nos.,	100 marks each	500 marks
Term Work	5 Nos.,	25 marks each	125 marks
Oral/Practical Examination	3 Nos.,	25 marks each	075 marks
			700 marks

During summer vacation between fourth and fifth term and/or during winter vacation between fifth and sixth term every student has to undergo Industrial/Practical training for a minimum period of two weeks. The report on training shall be submitted by every student in the beginning of the sixth term alongwith a certificate from the company. The candidate shall be required to present a seminar in the respective class in presence of two staff members responsible for it. This seminar shall carry 25 term work marks, which shall be one of the heads of five term works of the sixth term. If a student is not able to undergo practical training, then he can prepare a special study report or a minor project related to the concerned branch of engineering.

- 3.3A There shall be four theory subjects and three orals and / or practicals in Seventh and Eighth term each, including one optional theory paper to be opted from a group of courses. During seventh term every student individually will study a topic assigned to him and submit a report and shall deliver a short lecture / seminar on the topic at the time of seminar oral examination. The topic assigned will be related to the recent advancements in the concerned branch of engineering.

During seventh and eighth term, every student shall visit minimum three industries, factories construction site or organistaions pertaining to the respective branch of Engineering arranged by college and accompanied by teachers as per AICTE norms. The report of technical visits shall be submitted by every student in the end of eighth term which shall be evaluated by the concerned teachers through internal viva-voce.

- 3.3B Major Engineering Project shall be taken in the beginning of the seventh term in consultation with guide and must be completed in eighth term. The project proposal must be submitted in the beginning of the seventh term by every student or group of students (not more than five students in a group). The progress of the project shall be evaluated by a committee of teachers which shall include guide also and shall award the term work marks. The total marks in seventh and eighth term shall be as follows :

VII TERM

* Theory papers	4 Nos.,	100 marks each	400 marks,
* Term work	4Nos.,	25 marks each	100 marks
* Project Term work			050 marks
* Seminar oral			050 marks
* Practicals/orals	3 Nos.,	25 marks each	75 marks
			675 marks

VIII TERM

* Theory	4 Nos.,	100 marks each	400 marks
* Term work	4 Nos.	25 marks Each	100 marks
* Technical visit Term work			50 marks
* Project Term work			50 marks
* Projects oral Exam.			50 marks
* Oral/Practicals	3 Nos.,	25 marks each	75 marks
			725 marks.

Total marks of BE 1400

- 3.4 There shall be at least 14 weeks of teaching schedule in each term.
- 3.5 The teaching schedule in each term shall be as per the syllabus published by the university.
- 4 A candidate admitted to engineering course is required to fulfil the conditions as per Ordinance Nos. 68,69,70 and 73 before he/she is admitted to any term examination.
- 5 A candidate shall have to pass in all the term works of a term separately, failing which he/she will not be permitted to appear in the examination of the concerned term.
 - 5.1 A candidate who fails in any term work, will seek fresh admission in the term whenever it is available. If a candidate is not granted a first term, he/she is not entitled to be grant second term.
- 6 There shall be one university examination at the end of each term. These examinations will be designed as follows :
 - 6.1 (a) During First Year
First Term F.E., Second Term F.E.
 - (b) During Second Year
First Term S.E., Second Term S.E.
 - (c) During Third Year
First Term T.E., Second Term T.E.

(d) During Fourth Year
First Term B.E., Second Term B.E.

- 6.2 The examination at the end of each term, will generally be held in November/ December and April- May in each year.
- 6.3 There will be a full examination at the end of each term consisting of the theory papers and laboratory practicals/ orals of both the terms of each year.
- 6.4 There will be no supplementary examination.
- 7 A candidate is said to have passed a term examination if he / she has secured 40% marks in each head i.e. each theory paper, term work, practical, oral separately.
- 7.1 There shall be award of division separately for F.E., S.E., T.E., & B.E. examination as per the norms given in 7.1 (a), (b), (c), & (d)
- (a) A candidate obtaining 66% marks in or above in aggregate shall be placed in First Division with Distinction.
- (b) A candidate obtaining 60% marks in or above in aggregate but less than 66% shall be awarded First Division.
- (c) A candidate obtaining 50% marks in or above in aggregate but less than 60% shall be awarded Second Division.
- (d) A candidate obtaining 40% marks in or above in aggregate but less than 50% shall be awarded Pass Division.
- 7.2 Grace marks and other benefits shall be available as per the relevant ordinances.
- 7.3 The merit list will be declared separately for different branches of studies from amongst those candidates who have passed all the eight terms or six terms (as the case may be) individually in single attempt. Each such merit list will include the names of only three candidates.
8. A candidate who has been admitted in engineering course, will be promoted to the higher class in accordance with the following sub rules.
- 8.1 A candidate who has appeared in the first term of any particular year will go to second term of that year irrespective of failing in any number of theory or practicals/ orals of that term.
- 8.2 A candidate will be promoted to the next year provided he/ she does not carry a backlog of more than five examinations of the immediate previous year (combinations of theory and practicals/ oral taken together, with the condition that not more than three theory examination or not more than three practical or oral examinations) of the immediate previous year.
- 8.3 A candidate will not be permitted to appear in our examination which he / she has passed earlier.
- 8.4 A candidate will not be admitted to third year until and unless he / she clears first year.

Similarly, a candidate will not be admitted to fourth year until and unless he/ she clears second year.

8.5 In case a candidate fails in an examination but desires to appear again thereat,

- (a) He / she may at his/ her option claim exemption from appearing in the head /s of passing in which he / she has passed.
- (b) Such exemption, if claimed, shall cover all the heads of passing in which it can be claimed;
- (c) The marks obtained by the candidate in the heads of passing in which he/ she claimed exemption will be carried over for the subsequent examination.
- (d) Such exemption, if not availed of at the immediately subsequent appearance of the candidate at the examination shall be deemed to have lapsed;
- (e) The marks obtained by the candidates for termwork which is separately assessed will be carried over unless fresh termwork is presented by him/her after rejoining an affiliated College as a regular student in the corresponding Part Course.

8.6 The revised Four year Degree Courses in Engineering will be introduced gradually as under.

- a) F.E. Course From July, 1998.
- b) S.E. Course From July, 1999.
- c) T.E. Course From July, 2000.
- e) B.E. Course From July, 2001.

8.7 No candidate will be awarded degree of Bachelor of Engineering (B.E.) unless he/ she has passed all the eight term examinations. If any previous term paper/ practical/ oral remains as a backlog to be cleared by him/ her the result will be withheld till he/ she passes the backlog.

9. If a candidate after admission to First Year fails to be promoted to Second Year within three consecutive academic years, from the date of admission shall cease to be student of degree course in engineering. Further one has to pass all the examinations of four year degree course in six academic years from date of admission.

9.1 If a candidate is directly admitted to second year of four year degree course, he / she has to pass all the examinations of second, third and fourth year of engineering in five academic years from date of admission.

9.2 If due to some unavoidable reasons, few papers, practicals, orals remain uncleared of final year, mercy attempts may be given to such candidates by the university on case to case basis.

FIRST YEAR ENGINEERING
(Common to all Branches of Engineering)

First year- First Term

Sr. No.	Subject	Marks			Contact Hours/ Week	
		Th.	Pr.	T/w	Th.	Pr./Tw
1.	Engg. Mathematics-I	100	--	25	04	00
2.	Applied Science-I	100	--	25	04	02
3.	Engg. Graphics-I	--	--	25	02	02
4.	Engg. Mechanics	100	--	25	04	02
5.	Elements of Electrical and Electronics Engg.	100	--	25	04	02
6.	Communication Skill	--	--	25	02	--
7.	Workshop Practice-I	--	--	25	01*	02
		400	--	175	21 +	10 = 31

First year - Second Term

Sr. No.	Subject	Marks Contact Hours/ Week				
		Th.	Pr.	T/w	Th.	Pr.
1.	Engg. Mathematics-II	100	--	25	04	00
2.	Applied Science-II	100	--	25	04	02
3.	Engg. Graphics-II	100	--	25	02	02
4.	Elements of Mechanical Engg.	100	--	25	04	02
5.	Elements of Civil Engg.	100	--	25	04	02
6.	Computer Programming	--	--	25	01	02
7.	Workshop Practice-II	--	--	25	01*	02
		500	--	175	20 +	12 = 32
		Term I -	Term II -	Term I + II	Total	
Theory Marks		400	500	900 Marks		
Term work Marks		175	175	+350	1250	
Theory Hours		21	20			
Practical Hours		10	12	31 + 32 Hrs/ Week		

* Theory concerning workshop practice I & II are to be taught in workshop only to every batch going to workshop for practicals;

Note :- The theory paper examination duration will be of 3 (three) Hours except the theory paper Engg. Graphics-II which will be of 4 (four) Hours duration. Theory paper of Engg. Graphics-II includes theory of Engg. Graphics-I.

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(Term - I)

Subject :- Enginnering Mathematics - I

Teaching Scheme :
Lectures : 4 hrs/ week

Examination Scheme.
Paper : 100 marks
Paper Duraton : 3 Hrs
Term work : 25 marks

TOPIC	NO. OF LECT
<u>UNIT - I : Complex number with applications :</u>	09
1) Definition, Cartesian, polar, Exponential forms	
2) Argand Daigram	
3) De- Moivre's Theorem	
4) Roots of Complex numbers	
5) Hyperbolic function	
6) Logarithms of Complex numbers	
<u>UNIT - 2 : Matrices :-</u>	10
1) Elementary transformations.	
2) Rank of a matrix	
3) Reduction to normal froms, Canonical forms.	
4) Linear Dependence & Independence of vectors	
5) Consistancy of systems of linear equations	
6) Characteristic equations, Eigen valnes & Eigen vectors,	
7) Cayley Hamilton theorem	
<u>UNIT - 3 : Differential & Integral Calculus :-</u>	10
1) Successive Differentiation.	
2) Leibnitz theorem.	
3) Taylor's Expansion.	
4) Maclaurian's expansions	
5) Indeterminate forms, L Hospital's rule, limits.	
6) Reduction formula for nth order senusodal functions (only introduction)	

UNIT - 4 :- Differential Equations : (First Order & First Degree)

10

- 1) Definition, order, degree, etc,
- 2) Variable separable form.
- 3) Homogeneous differential equations.
- 4) Differential equation reducible to homogeneous type.
- 5) Exact differential equations.
- 6) Differential equation reducible to exact.
- 7) Linear Differential equations.
- 8) Reducible to linear type.
- 9) Methods of substitution & Misc. Types.

UNIT - 5 A) Application of Differential Equations.

08

(Of First Order & first Degree)

- 1) Motion under gravity & rectilinear motion.
- 2) L- R, R -C, & L - C Circuits.
- 3) Newton's law of cooling
- 4) Conduction of heat.

B) Matrices :-

03

- 1) Linear transformations.
- 2) Orthogonal transformations & orthogonal matrix.
- 3) Quadratic forms.

Term Work : (25 Marks)

- 1) One assignment of 15 problems on each unit. (15 Marks)
- 2) One class test. (10 marks)

Books Recommended :

- 1) Applied Mathematics I by Prof. P. N. Wartikar, J. N. Wirtikar.
- 2) Engg. Mathematics by Dr. Gokhale, Majumdar, Patil.
- 3) Engg. Mathematics by Dr. B. S. Grewal,
- 4) Advance Engg. Mathematics by Wyle.
- 5) Advance Engg. Mathematics by Erwin, Kreyszig.

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SEMSTER - I
Sub- APPLIED SCIENCE - I

Teaching Scheme :-

Theory : 4 Hrs/ Week :-

Practical : 2 Hrs/ Week :-

Examination Scheme :

Paper : 100 Marks.

Duration : 3 Hrs.

Term Work : 25 Marks.

SECTION : I (PHYSICS) (50 marks)

UNIT - I: ELECTIRCAL PROPOERTIES :-

Band theory of solids, Classification of solids on the basis of band theory of solids. Fermi-Level and position of fermi level in interinsic semiconductors and in exterinsic. Conductivity in semiconductors. Band structure of PN Junction, Diode under forward and reverse biasing. Display devices- LED, LCD, Plasma.

5 Hrs.

UNIT - II : OPTICS :

- (A) Interference, Michelson's Interferometer, Applications of Interference. 2 Hrs.
- (B) Diffraction of waves, Classes differaction, Diffraction at a single slit, conditions for maxima and minima, plane diffraction grating, conditions for principal maxima and minima, Rayleigh's criterion for resolution, Resolving power of grating and telescope. 4 Hrs.
- (c) Polarisation - Polarisation by refelction, Brewster's law, Double refraction, Nicol prism, law of Malus, Dichroism, Polariods, Engineering applications of polarisation. 4 Hrs.

UNIT - III, (A) : X-RAYS AND LASER :

X- rays, propèrties, production and origin of x-rays, continuous and characteristic x-rays, applications of x-rays, diffraction of x-rays, Bragg's spectrometer, Compton effect and compton shift (without derivation), Laser; properties and mechanism of production of laser, Ruby Laser, Gas Laser, applications of Laser, Fibre optics, types of optical fibres, Numerical aperture optical laws, Holography.

6 Hrs.

UNIT - III (B) : MODERN PHYSICS :

Motion of charged particle in electric and magnetic field and combined fields, Magnetostatic focussing, Electrostatic focussing, Electron microscope, Motion of a charged particle in a non- uniform magnetic field, magnetic bottle. Principle, construction and working of Cathode ray oscilloscope, positive rays, Baidoridge Mass Spectrograph.

4 Hrs.

APPLIED SCIENCE - I, SECTION - I (PHYSICS) PRACTICALS :

Any Five Experiments:-

- 1) Wavelenght by diffraction grating.
- 2) Semiconductor diode characteristics.
- 3) Band gap of semiconductor material.

- 4) Expt. based on laser.
- 5) Uses of C.R.O.
- 6) Fibre Optics Communication.
- 7) Display Devices.
- 8) Resolving power of a Telescope.

REFERENCE BOOKS

- 1) Engineering Physics- by Sen, Gaur & Gupta.
- 2) Optics - by Brijlal & Subramanyam
- 3) Physics for Engineers - by M. R. Shrinivasan.
- 4) Modern Physics - J. B. Rajan.

SECTION - II CHEMISTRY (50 MARKS)

UNIT - I : WATER

- (A) **Introduction,**
- (a) Sources of water.
 - (b) Effects of impurities in water on the properties of water.
- (B) **Hardness of water :-**
- (a) Temporary and permanent hardness.
 - (b) Estimation of hardness of water.
 - i) Soap solution methods and
 - ii) E.D.T. A. Method.
- (C) **Units of hardness of water.**
- (a) Parts per million,
 - (b) Equivalents per million.
 - (c) Grains per imperial gallon,
 - (d) Inter-relation between the various units.
- (D) **Chemical analysis of hard water.**
- (a) Alkalinity due to
 - i) Hydroxide,
 - ii) Carbonate
 - iii) Bicarbonate.
 - (b) Simple numerical problems on the estimation of alkalinity.

(E) Treatment of water.

- (a) Treatment for domestic purposes.
- (b) Treatment for industrial puposes.
- (c) Study of the following techniques for water treatment.
 - i) Sedimentation
 - ii) Coagulation.
 - iii) Filtration and
 - iv) Sterilization.

(F) Softening of water.

- a) Lime soda process,
- b) Synthetic ion exchange resins,
- c) Deionization of water.

(G) Boiler feed water.

- (a) External tratment.
- (b) Internal treatment.

(H) Boiler troubles :

- (a) Scale formation.
- (b) Prevention of scale formation.

8 Hrs.

UNIT -II (A) FUEL

- (A)** (a) Definition, (b) Classification, (c) Definition of calorific value, Gross C.V. and net C.V.,
(d) Units Of C.V.

(B) SOLID FUEL

- (a) Determination of C.V. by Bomb calorimeter.
- (b) Coal and its classification.
 - (c) Analysis of coal.
 - i) Ultimate Analyasis and its importance.
 - ii) Proximate Analyasis and its importance.
 - iii) Cole -Types of coke and its properties.

(C) LIQUID FUEL.

- (a) Determination of C.V. by Boy's calorimeter.
- (b) Fractional distillation of petroleum.
- (c) Various tractions depending on boiling range such as Gasoline, Kerosine, diesel, lubricating oil.

(d) Power alcohol and its importance as fuel.

(D) GASEOUS FUEL.

(a) Introduction

(b) Composition, properties and applications of water gas, producer gas, natural gas, liquified petroleum gas and Gobar gas.

(E) NUCLEAR FUEL.

(a) Nuclear fission

(b) Nuclear fusion

(c) Nuclear reactors

(d) Binding energy.

6 Hrs.

UNIT -II B) : LUBRICANTS :

(A) Introduction.

(a) Mechanism of Lubrication.

i) Fluid film lubrication

ii) Boundary Lubrication.

iii) Extreme pressure lubrications.

(B) Classification of lubrications.

(a) Solid lubricants.

(b) Semisolid lubricants.

(c) Liquid lubricants.

(d) Synthetic lubricants.

(e) Emulsion.

(C) Condition for using different types of lubricants.

(D) Properties of lubricants and significance.

(a) Physical Properties.

i) Viscosity and viscosity index, Redwood Viscometer for its determination.

ii) Flash and fire point- determination of it by using Pensky Marten's apparatus.

iii) Aniline point- experiment for the determination of aniline point.

iv) Oiliness

v) Cloud point and pour point.

vi) Volatility.

(b) Chemical properties.

- i) Saponification value- its determination
- ii) Neutralization numbers - its determination
- iii) Emulsification.

6 Hrs.

UNIT- 3 (A) : STRUCTURES AND PROPERTIES OF SOLIDS :

Metallic bond expansion of metallic properties :-

- i) Electrical conductivity.
- ii) Thermal conductivity.
- iii) Metallic Luster.
- iv) Softness Malleability and ductility.
- v) Tensile strength.
- vi) Elasticity.
- vii) Melting point.

(B) TYPES OF SOLIDS

- i) Amorphous solids.
- ii) Crystalline solids.
- iii) Isotropy and anisotropy.

(C) CRYSTALLOGRAPHY.

- i) Units cell.
- ii) Types of units cells.
- iii) Bravais Lattices:
- iv) Symmetry elements of crystals.
- v) Crystal structures of sodium chloride, diamond, graphite and silicates.
- vi) Close packing in metal crystals, hexagonal close packing and cubic close packing.

5 Hrs.

REFERENCE BOOKS

- 1) A Text Book of Engineering Chemistry- By. S. S. Dara (Third Edition)
- 2) A Text Book of Engineering Chemistry- By M. M. Uppal, (Edition, 1990, Khanna publishers, Delhi.)
- 3) Engineering Chemistry- by Jain & Jain.
- 4) Applied Science- by Dr. Walzade, Prof. S. Narkhede.
- 5) Applied Science - by I. Dr. Wahegaonkar, Mr. Paul, Mrs. Panajkar, Mrs. by Parulkar, Mrs. Deshpande, Prof. Jawale, (Nirali Prakashan, Pune.)

TERM WORK (CHEMISTRY)

The Term work shall consist of a record of laboratory experiment, performed by the students, at least five experiments from following.

LIST OF EXPERIMENTS :

- 1) Estimation of total hardness of a given sample of water by E.D.T.A. Method.
- 2) Estimation of chlorides in a given sample of water by Mohr's Method.
- 3) Use of PH Meter.
- 4) Determination of saponification value of an oil.
- 5) Determination of miline point of an oil.
- 6) Determination of coefficient of viscometer by Ostwald's
- 7) Determination of Iron (Fe) contents of water colorimetrically.
- 8) Iodometric titrations.
- 9) Determination of Moisture & ash of coal in given sample of coal.

REFERENCE BOOKS

- 1) Practical Applied Chemistry-I Mrs. Parulekar, Prof. Jawale, Mrs. Deshpande, (Nirali Prakashan, Pune.)

TERM - I

SUBJECT :- ENGINEERING GRAPHICS -I

TEACHING SCHEME

LECTURES :- 2 Hrs/ Week

PRACTICALS :- 2 Hrs/ Week

EXAMINATION SCHEME

TH. PAPER with Engg. Gra. I & II

TERM WORK : 25 MARKS.

UNIT - 1 :

1. Lines, Lettering, Numbering, Dimensioning and Scales :- Different types of lines used in practice, Method of dimensioning i.e. aligned & unidirectional systems (According to SP.46 : 1988 Engg. Drawing practice for schools and colleges), Scales, Principles of orthographic projections, Horizontal planes, Vertical planes, Front view, Top view, Side view, Projections, Projections of points (no question to be asked.)

5 Hours.

A. PROJECTIONS OF LINES :-

Line inclined to both the principal planes, Traces of lines, Distance of a point from a given line.

4 Hours.

B. PROJECTIONS OF PLANES :-

Projections of planes such as triangle, square, rectangle, rhombus, pentagon, hexagon, trapezium, circle etc. Finding inclinations of surface with HP & VP. Obtaining true shape of surface, angle between two planes, distance of a point from a given plane.

4 Hours.

UNIT - 2 :-

A. PROJECTIONS OF SOLIDS :-

Projections of solids such as Pyramids, Prisms, Cones, Cylinders and Spheres. Axis inclined to both the reference planes and combination of solids.

4 Hours.

B. SECTIONS OF SOLIDS :

Projections of solids cut by AVP and AIP, Projection of true shape of section to locate the section plane, to obtain the given true shape of section.

4 Hours.

TERM WORK (TERM - I)

Sheet No : 01	:-	Lines, Lettering and methods of dimensioning.
Sheet No : 02	:-	Projections of Lines (At least 3 Examples)
Sheet No : 03	:-	Projections of Planes (At least 3 Examples)
Sheet No : 04	:-	Projections of Solids (At least 3 Examples)
Sheet No : 05	:-	Sections of Solids (At least 3 Examples)
Sheet No : 06	:-	Free hand sketches of Machine elements.

BOOKS RECOMMENDED :

1. Engg. Graphics by R. V. Mali & B. S. Chaudhari.
2. Elementary Drawing by N. D. Bhatt.
3. Machine Drawing by N. D. Bhatt.
4. Engg. Graphics by M. I. Dhabhade.

TERM - I
SUBJECT :- ENGINEERING MECHANICS

TEACHING SCHEME

LECTURES :- 4 Hrs/ Week

PRACTICALS :- 2 Hrs/ Week

EXAMINATION SCHEME

Theory Paper :- 100 Marks

Paper Duration : 3 Hrs.

TERM WORK : 25 MARKS.

UNIT - I

- A) INTRODUCTION :-** Basic concept and fundamental principles of statics such as Newton's three laws of motion, gravitational conditions of equilibrium for two force transmissibility of force and superposition of forces.
- B) CONCURRENT FORCES (E) IN PLANE :-** Scalar and vector, addition of two forces, concept of resolution of forces into components, resultant of several forces, resultant of several concurrent coplanar forces, polygon, law by summing rectangular components (Method of projection) equation of equilibrium for a system of concurrent forces, constraints, action and reactions, types of support reactions Free body diagram-
- i) Equilibrium of a body subjected to two forces (two force body)
 - ii) Equilibrium of a body subjected to three forces, Moment of a force, theorem of Varignon equation & equilibrium.
- (C) PARALLEL FORCES IN PLANE :-** Parallel forces, Resultant of two parallel forces acting in the same direction, Resultant of two unequal parallel forces acting in opposite directions, two equal parallel forces acting in opposite directions. Couple, equivalent system of forces, General case of parallel forces in a plane. Distributed forces in a plane, Hydrostatic pressure. Forces on submerged surfaces.
- (D) EQUILIBRIUM OF FORCES :-** Introduction, Principles of equilibrium, Analytical methods for equilibrium of coplanar forces, Lami's theorem, graphical method for the equilibrium of coplanar forces. Equilibrium of non-coplanar forces, conditions and types of equilibrium simple beam reactions. Force, system in space (Vector treatment) Definition, Components of force, Defining a force by its magnitude and two points on its line of action. Components of vector, Vector operation. Angular Velocity, moment of a force, component of vector and moment about an axis. Resultant of a system of forces in a space.

UNIT - 2

- A) CENTROID CENTER OF MASS AND CENTRE OF GRAVITY :-** Introduction, centre of gravity of body : determination by the method of moments, concept of centroid, centroid of two dimensional body, Determination of centroid and centre of gravity. Integration method, centroid of a composite plane figures, Graphical method.
- B) MOMENT OF INERTIA :-** Introduction, moment of Inertia of a plane figure with respect to an axis in its plane, polar moment of Inertia, radius of gyration of an area, parallel axes theorem, Moment of Inertia of composite hollow section, product of inertia, moment of Inertia of mass (rigid bodies.)

- C) **ANALYSIS OF STRUCTURES** :- Compound beam, Engineering application of two forces and multi-force members, forces in Truss members by method of joints, Method of sections. Graphical method. Frames cable analysis under concentrated load only.
- D) **PRINCIPLE OF VIRTUAL WORK** :- Introduction, principles of virtual works, Applications of principle of virtual work, potential energy and equilibrium, stability of equilibrium, stable, unstable and Neutral.
- E) **SIMPLE LIFTING MACHINES** :- Simple machines and definitions, Ideal machines and frictional losses, pulleys and System of pulleys, wheel and Axel, Differential wheel and axel. Differential pulley block, Worm and Worm Wheel screw, friction, relation between effort and weight lifted by a screw jack, Efficiency of a screw jack.

UNIT - 3

- A) **BASIC CONCEPT** :- Distance Travelled, Displacement, Position vector velocity, Acceleration in various co-ordinates system (Cartesian, polar, cylindrical) Path Variable Newton's law, De' Alembert's principle, Relative motion, principle of work, Energy, Power, Impulse momentum, direct central impact.
- B) **ONE DIMENSIONAL PROBLEM** :- Kinematic and problems of Dynamic with reference to rectilinear motion including motion under gravity on a particle acted upon by constant force, Force as function of time, Displacement, velocity, motion diagrams.
- C) **RECTILINEAR MOTION OF A PARTICLE** :- I) Kinematics :- Defining the position at any time of a particle moving rectilinearly in a straight line, expression for velocity and acceleration. Motion functions and diagrams, some typical rectilinear motion, Relation between displacements and velocities of two connected particles. Relative motion of two bodies which are both moving in a plane with constant velocities.
- D) **Kinetics**- Equation of rectilinear motion, equation of dynamic equilibrium, De' Alembert's principle.

UNIT - IV

- A) **Motion of Rigid Body** - Kinematics and kinetics of rigid body about a fixed axis, Rotation under a constant moment/ torque De' Alembert's principle. Torsional pendulum, compound pendulum, principles of work energy. Impulse momentum and conservation of angular momentum.
- B) **Plane motion of rigid body** :- Introduction, Instantaneous coefficient of rotation (also by Graphical method) Rolling of one body on another without slip, kinetic of plane motion, Application of momentum, Impulse principle, application of the work Energy principles (Problems on ring, disc, spheres).

UNIT - V

- A) **Friction** : Introduction, frictional forces, Laws of friction, coefficient of friction, angle of friction and cone of friction, equilibrium on rough inclined plane, Ladder problem, Wedge and block. Impending motion of a body placed on a rough inclined plane, Flat belt, and V belt friction, equilibrium problem involving frictional force, Friction on wheel moving on surface, Band brakes.
- B) **Curvilinear motion of particle kinematic** :- Introduction, Position vector, velocity and acceleration components of motion. Rectangular components, components of acceleration :-

Normal and Tangential, components of motion Radial and Transverse.

Kinetics :- Introduction, Equation of motion in Rectangular Tangential and Normal Components, Equation of dynamic equilibrium. D' Alembert's Principles, working concepts, curvilinear motion of vehicles, levelled and banked roads.

Term Work (25 Marks)

The term work shall consist of a record of laboratory experiments, exercises and drawings as listed below :-

List of Experiments :-

(Any Eight experiments of the following)

- 1) Reaction of beams.
- 2) Belt friction - Flat and V-belt.
- 3) Torsional Pendulum.
- 4) Compound Pendulum.
- 5) Demonstration of Concepts.
 - A) Impact of elastic bodies.
 - B) Rolling of various bodies.
 - C) Coefficient of restitution.
 - D) Motion of a Vehicle.
- 6) Force in plane trusses : Jib cranes.
- 7) Moment of Intertia of Flywheel.
- 8) Study of Gear Trains- Simple, Compound and epicyclic.
- 9) Study of simple machines (two machines used in practice as lifting machines.)
- 10) Study of space force.

Compulsory Graphical Work :-

- 1) Graphic Statics - 4 Problems, one on each unit.
- 2) Graphic Dynamics - 4 problems, one on each unit.

Text Book

- 1) Engineering Mechanics by : A. K. Tayal.
- 2) Engineering Mechanics Vol I & II by : V. S. Mokashi.

Reference Books

- 1) Engineering Mechanics by Shames.
- 2) Engineering Mechanics by Timoshenko and Yung
- 3) Vector Mechanics by Bear and Johnson.

TERM - I

ELEMENTS OF ELECTRICAL & ELECTRONICS ENGINEERING

TEACHING SCHEME

LECTURES :- 4 Hrs/ Week

PRACTICALS :- 2 Hrs/ Week

EXAMINATION SCHEME

Paper :- 100 Marks

Paper Duration : 3 Hrs.

Term Work : 25 Marks.

UNIT - I

DC Circuits & Network theorems :-

Lumped parameters branch, node, loop, Kirchoff's laws, Series, parallel circuits. Ammeters & voltmeters use in circuits. Voltage, current sources, dividers, Star (Wye) to delta transformations. Short & open circuits, Ratings of dc machines & batteries. One porting two port circuits. Analysis by network reduction method, mesh current method & node voltage method. Network theorems : superposition, Thevenin's & Norton's theorems. Non-linear circuits Bridge circuit.

(6 Hours)

Inductive & Capacitive dc circuits :-

Transients & steady state solutions, step response of series RC, RL circuits. Blocking capacitors. Pulse response of RC circuits. Integrating & differentiating circuits, DC circuits with inductors & capacitors.

(4 Hours)

UNIT - II

AC circuits : Representation of an ac source, polarity of ac source, generation of a ac voltage, single & three phase ac generations, AC waveform, peak, average & rms values. Phasors representation of sinusoidal wave forms, concept of lead & lag. Impedances, admittances in series & parallel. Steady state solution of Ac circuits using phasors, Power in ac circuits, lagging & leading power factor RL & RC filters. Maximum power transfer theorem, ac case.

(10 Hours)

UNIT - III

Semi conducting Devices : Zener diode break-down characteristics & use as voltage regulator. Schottky diode & photo-conductive diode. principle of operation & use. P-N-P & N-P-N. transistors. Transistor biasing, characteristics, graphical ac analysis using load line. Transistor biasing methods comparison of amplifier configuration. UJT & SCR operation, characteristics & applications.

(6 Hours)

Operational Amplifiers : Ideal operational amplifier, op- amp as comparator, inverting & non-inverting amplifier. op-amp characteristics such as input & output resistances. bandwidth, slew rate, CMRR & Offset Voltages.

(4 Hours)

UNIT - IV :-

Number systems & logic gates : Decimal, binary, octal & hexadecimal number systems. Binary

addition & subtraction. Fractional numbers, BCD numbers, Boolean algebra for OR, AND, NOT & NAND operations, De -Morgan's theorem. Logic gates AND, OR, and NOT, DL, DTL, RTL, DCTL, CML, TTL logics. Symbols of logic gates AND, OR, NOT and NAND. Half adder and full adder realizations using gates.

(8 Hours)

UNIT - V

Computer Concepts :-

Microcomputer organization, functional components of a computer. Architecture of a microcomputer. Stored programme concept, hexadecimal notation. Input & Output devices, punched cards, punched paper tapes, Keyboards & CRT terminals, Printers, Monitors, RAM & ROM.

(6 Hours)

Microprocessor programming & applications :

8085 microprocessor architecture, instruction set, program writing & application for problems like addition & multiplication.

(4 Hours)

REFERENCE BOOKS :-

- 1) Electrical & Electronics Engineering for Scientists & Engineers - K. A. Krishnamurthy & M. R. Raghuvver. New Age International (P) Ltd.
- 2) Electronic Principles - Molvino, Fifth edition, Tata McGrawHill.
- 3) Electronics devices & circuits - Allen Mottershead, Tata McGraw-Hill.
- 4) Basic Electrical, Electronics & Computer Engineering - R. Muthusubramanyam, S. Salivahanan, K. A. Muraleedharan, Tata McGraw- Hill.
- 5) Basic Electrical Engineering - A. E. Fitzgerald, David E. Higginbotham, Arvin Grable. 5th edition, McGraw-Hill International edition.

LIST OF EXPERIMENTS -

The students should be demonstrated the use of voltmeters, ammeters, multi meter, oscilloscope, function generator & power supplies.

GROUP A

1. Verification of Kirchoff's Laws.
2. Verification of Superposition Theorem.
3. Verification of Thevenin's Theorem,
4. Verification of Norton's Theorem,
5. Verification of Maximum Power Transfer Theorem.
6. Integrating & differentiating RC circuits.

GROUP B

1. Transistor Amplifier : Measurement of voltage gain. Input & Output impedances.
2. UJT relaxation oscillator.
3. SCR as switch.
4. Op-Amp inverting non-inverting amplifiers.
5. Realization of half adder & full adder using logic gates.
6. Microprocessor applications for addition & multiplication.

The term-work should include a minimum of eight experiments, at least four from each groups A & B. The term work should be regularly assessed by the internal examiner.

TERM - I
SUBJECT :- COMMUNICATION SKILL.

SUB. CODE NO.

TEACHING SHEME

Lectures :- 2 Hrs/ Week

EXAMINATION SCHEME

Term work 25 marks.

UNIT - 1 :-

Paragraph Writing.

UNIT - 2 :-

Business Letter Writing :-

Orders, Inquiries, Complaints, Applications, Circulars, Letters.

UNIT 3 :-

Correction of Sentences.

UNIT 4 :-

Comprehension of Unseen Passages, Precise Writing.

UNIT 5 :-

Principles of Oral Communications :-

The process of formal oral communication, Designing oral messages, Analysing audience, Selecting methods presentation form improptu, memorized, read and extemporalneous speech, preparation and presentation of formal speech.

UNIT 6 :-

1. Oral Skills. :-

Phonic system of English Language- Vowels, Consonets & Diphthongs, Syllables & Word accent, Connected speech- rhythm, pitch & intonation, Improving intelligibility of spoken language.

NOTE : Term work will consist on assignments based on above units.

TERM - I
SUBJECT :- WORKSHOP PRACTICE -I

SUB. CODE NO.

TEACHING SCHEME

LECTURES :- 1 Hrs/ Week

PRACTICALS :- 2 Hrs/ Week

EXAMINATION SCHEME (F. E. Common)

Term Work 25 Marks.

1. Study of various tools, measuring instruments, used in carpentry, foundry, fitting and smithy and operation and applications of the processes.
2. Each Candidate shall be required to complete following jobs.
 - a) Carpentry - Any one wood Joint, use of filler materials adhesives etc. (one Job)
 - b) Foundry - Preparation of sand mould (one Job).
 - c) Fitting - One job on fitting including drilling & Tapping and hacksaw operation.
 - d) Smithy - One job including bending & flatening operations or one job with various operations (minimum two operations.)

Note -

A) The candidates are required to finish the job to the following limits.

(1) Carpentry : +2 mm.

- 2 mm.

(2) Fitting : +0.025 mm.

- 0.025 mm.

(3) Smithy : +2 mm.

- 2 mm.

B) Work book shall include description with sketches of all operations on above trades.

C) Theory concerning is to be taught in workshop only to every batch while going to workshop for practicals ; not in lecture rooms.

North Maharashtra University, Jalgaon
Revised Syllabus for First Year F. E.
Common to all Branches
with effect from 1998-99

(Term - II)

Subject : Engineering Mathematics - II

TEACHING SCHEME

LECTURES :- 4 Hrs/ Week

EXAMINATION SCHEME

Paper :- 100 Marks

Term Work : 25 Marks.

TOPIC

NO OF LECT.

UNIT 1 : Solid Geometry :-

09

- 1) Co-ordinate systems.
- 2) Sphere
- 3) Cone
- 4) Cylinder.

UNIT 2 : Partial Differentiation & Its Applications :-

11

- 1) Partial Derivatives.
- 2) Euler's theorem.
- 3) Implicit function
- 4) Total derivatives
- 5) Change of Independent variables
- 6) Errors & approximations

UNIT 3 : Differential & Integral Calculus :-

09

- 1) Curve tracing.
- 2) Rectification.
- 3) Differentiation under integral sign.
- 4) Beta, Gamma & Error Function.

UNIT 4 : Double & Triple Integrations :-

11

- 1) Double & Triple Integration.
- 2) Applications of multiple integrals to mean value, RMS values, Area, Volumes and Centre of Gravity.

UNIT 5 : Fourier Series :-

07

- 1) Definition, Dirichlet's conditions.
- 2) Full range fourier series on $c \leq x \leq c+2\pi$
- 3) Full range fourier series on $c \leq x \leq c+2L$
- 4) Half range fourier series.
- 5) Application to analysis of problems involving periodic disturbances.

B) Application of Partial Differentiation :

03

- 1) Jacobian
- 2) Lagrange's Method of undetermined multipliers.

Term Works :- (25 marks)

- 1) One assignment of 15 problems on each unit. (15 marks)
- 2) One class test (10 marks)

Book Recommended :

- 1) Applied Mathematics - II by Prof. P. N. Wartikar, J. N. Wartikar.
- 2) Engg. Mathematics by Dr. Gokhale, Mujumdar, Patil.
- 3) Engg. Mathematics by Dr. B. S. Grewal
- 4) Advance Engg. Mathematics by Wyle.
- 5) Advance Engg. Mathematics by Erwin, Kreyszig.
- 6) Schaum series.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
SEMISTER - II

SUBJECT : APPLIED SCIENCE- II

SUBJECT CODE NO.

TEACHING SCHEME

LECTURES :- 4 Hrs/ Week

PRACTICALS :- 2 Hrs/ Week

EXAMINATION SCHEME

Paper :- 100 Marks

Paper Duration : 3 Hrs.

Term Work 25 Marks.

SECTION - I : APPLIED PHYSICS-II (50 MARKS.)

Unit - I : QUANTUM MECHANICS :

Wave nature of matter, De-Broglie's Waves. Wavelength of matter waves, electron diffraction, Davisson and Germer's expt, Heisenberg's uncertainty principle with illustrations, Schrodinger's time dependent and time independent wave equation. Possible significance of wave function
i). Applications of Schrodinger's time independent wave equation to the problems of particle in rigid box. ii) Particle in non-rigid box. iii) Harmonic oscillator. iv) Hydrogen atom (Qualitative discussion.)

7 Hrs.

Unit - 2 (A) : ACOUSTICS :

Elementary acoustics, Reverberation and Reverberation time, Sabine's formula without derivation. Intensity Level, Acoustics of buildings. Limits of audibility.

Ultrasonic waves, production by piezoelectric and magnetostriction oscillator. Engineering applications of Ultrasonic waves, Ultrasonic testing systems, Ultrasonic testing methods contact method and Immersion method.

5 Hrs.

Unit - 2 (B) ENERGY SOURCES :

Introduction to non-conventional energy sources- solar, Solar cell, Biogas, wind tidal, geothermal energy sources.

5 Hrs.

Unit- 3: MAGNETIC MATERIALS AND SPECTROSCOPY.

The magnetism of matter, Classification of magnetic materials, Ferromagnets and their uses. Hysteresis loop, hard and soft magnetic materials. Superconductivity, Properties of superconductors. Applications of superconductors, Effect of magnetic field on spectral lines, Zeeman effect (normal and anomalous). Nuclear magnetic resonance. Magnetic Resonance Imaging in medical field.

7 Hrs.

TERM WORKS

ANY FIVE EXPERIMENTS :

- 1) Solar cell Characteristics.
- 2) Magnetic Susceptibility measurement.
- 3) Hysteresis curve.
- 4) Ultrasonic Interferometer.
- 5) Sound level measurement.
- 6) e/m by Thomson's method.
- 7) Ultrasonic detectors.

REFERENCE BOOKS :

- 1) Atomic Physics- by Yerwood.
- 2) Atomic Physics -by Richards and Wehar.
- 3) Modern Physics - by B. L. Theraja.
- 4) Modern Physics - by V.K. Mehata.
- 5) Atomic & Nuclear Physics - by Brijlal & Subramanayam.
- 6) Physics for Engineers- by M. R. Srinivasan.
- 7) Engineering Physics by- R. K. Gaur & M. L. Gupta.
- 8) Text Book of Sound - by Wood
- 9) Electrical Engg. Materials - by C. S. Indulkar.

SECTION – II CHEMISTRY (50 MARKS)

Unit - I : CORROSION :

- (A) (a) Definition.
(b) Causes.
(c) Consequence of corrosion.
- (B) **Classification of Corrosion.**
(a) Dry corrosion.
(b) Wet corrosion.
- (C) **Theory of corrosion.**
Electrochemical Theory of corrosion.
- (D) **Atmospheric corrosion, Factors influencing atmospheric corrosion.**
- (E) **Factors influencing corrosion.**
(a) Nature of the metal.
(b) Nature of the environment.
- (F) **Corrosion of boiler tubes and plates.**
- (G) **Testing and measurements of corrosion.**
- (H) **Passivity.**
- (I) **Corrosion Control.**
(a) Design and material selection.
(b) Cathodic protection.
(c) Anodic protection.
- (J) **Protective coatings :**
(a) Metallic coating of zinc, tin, nickel, chromium, aluminium and copper.
- (K) **Electroplating.**
- (L) **Hot dipping.**

(M) **Organic coating.**

8 Hrs.

Unit - 2 (A) POLYMERS.

(A) **Introduction.**

(B) **Classification.**

- (a) Organic Polymers.
- (b) Inorganic Polymers.

(C) **Types of polymerisation.**

(D) **Thermoplastics and thermosettings.**

(E) **Brief account of the following plastics :**

- (a) Polyeshylene.
- (b) Polyscyrene.
- (c) Polyvinyl chloride.
- (d) Nylon.
- (e) Teflon.
- (f) Polyester resin.
- (g) Epoxy resin.
- (h) Melamins formaldehyde resins.
- (i) Polytetra fluoroethylene.

(F) **Rubber.**

- (a) Natural rubber.
- (b) SBR.
- (c) Vulcanisation rubber.
- (d) Properties and applications of rubber stress- strain relationship of plastics and rubbers in comparison with the metals.

6 Hrs.

Unit - II (B) CHEMISTRY OF ENGINEERING MATERIALS

(A) **Ceramics :**

- (a) Classification.
 - (i) Traditional ceramics.
 - (ii) New ceramics
- (b) Basic raw materials for the preparation of ceramics.

- (i) Clay.
- (ii) Feldspars.
- (iii) Sand
- (c) Drying and firing of ceramics wares.

(B) CEMENT.

- (a) Definition.
- (b) Types of cement.
 - (i) Natural cement.
 - (ii) Portland cement.
 - (iii) Pozzolana cement.
- (c) Composition of the raw materials used for the portland cement.
- (d) Composition of the manufactured portland cement.
- (e) Manufacture process of portland cement.
- (f) Properties of portland cement.
- (g) Setting and Hardening of cement.
- (h) Applications of the cement.

(C) GLASS :

- (a) Definition.
- (b) Classification.
- (c) Chemical composition of glass
- (d) Properties of glass.
- (e) Uses of each type of glass.
- (f) Outline of the process for the manufacture of glass.

(D) REFRACTORIES.

- (a) Definition
- (b) Classification
- (c) General properties of refractories.
- (d) Preparation, Properties and uses of each type of refractory.
- (e) Steps involved in the manufacture of refractories.

(E) PAINTS AND VARNISHES :

- (a) Definition
- (b) Constituents
- (c) Properties of paints
- (d) Uses of the paints
- (e) Characteristics of a good paint.

- (F) **VARNISHES :**
(a) Definitions.
(b) Types of varnishes.
(c) Properties and uses of each type of varnishes.
(d) Characteristics of good varnishes.
- (G) **ENAMELS : Definition and application.**
- (H) **LACQUERS : Definition and application.**

5 Hrs.

UNIT - III : POLLUTION

- (A) **WATER POLLUTION :**
a) Classification of water pollutants.
 i) Organic.
 ii) Inorganic.
 iii) Sediments.
 iv) Radioactive materials and
 v) Thermal pollution.
b) Water quality parameters and standards.
- (B) **AIR POLLUTION.**
i) Classification of air pollutants :-
 Pollution due to
 a) Carbon monoxide.
 b) Oxides of nitrogen.
 c) Sulphur dioxide.
 d) Hydrocarbons.
 e) Particulates.
 ii) Air pollution from industries
 iii) Air pollution due to automobiles.
 iv) Air pollution control.
 v) Air quality standards.
- (C) **ACID RAIN :**
- (D) **NOISE POLLUTION.**
(a) Introduction.
(b) Sound and its measurement.
(c) Exposure to noise.
(d) Effects of exposure to noise.
(e) Noise pollution control.

6 Hrs

REFERENCE BOOKS :

- 1) A Text Book of Engineering Chemistry by S. S. Dara. (Third Edition) S. Chand & Co. Delhi
- 2) A Text Book of Engineering Chemistry.
by M. M. Uppal (Edition, 1990) Khanna Publishers. Delhi.
- 3) Introduction of Environment
by M. N. Shastri, Himalaya Publishing House, Mumbai.
- 4) Industrial Chemistry
by V. C. Kolhe & K. M. Gokhale, Narendra Prakashan, Pune.

APPLIED SCIENCE - II (SECTION -B) CHEMISTRY

PRACTICALS- TERM WORK (25 MARKS)

The term Work shall consist of a record of laboratory experiments performed by the students at least 5 experiments from following list.

LIST OF EXPERIMENTS :

- 1) Determination of partition co-efficient of iodine between water and carbon tetrachloride.
- 2) Determination of phenol volumetrically in the given solution.
- 3) Determination of acid value of resin and vegetable oil.
- 4) Determination of electrochemical equivalent of the copper using copper voltameter.
- 5) Estimation of copper from brass iodometrically.
- 6) Estimation of iron alloy gravimetrically and volumetrically.
- 7) Estimation of zinc in the brass volumetrically.
- 8) Determination of percentage of calcium in the cement.

REFERENCE BOOKS :

- 1) Practical Applied Chemistry-II
by Mrs. Parulekar, Prof. Jawale, Mrs. Deshpande, Niarali Prakashan, Pune.

SUBJECT : ENGINEERING GRAPHICS - II

SUB. CODE NO :

EXAMINATION SCHEME

TEACHING SCHEME

THEORY : - 100 MARKS

LECTURES : 2 Hrs/Week

Theory Paper : - 04 Hrs. Duration.

PRACTICES :- 2 Hrs./Week.

Term Work - 25 Marks.

UNIT - 3 :-

A. DEVELOPMENT OF SURFACES :

Development of lateral surfaces of solids. To draw development of out solids. To draw development of transisation pieces. (Two hollow solids of different cross sections) to draw principal views from given developments.

8 Hours.

UNIT - 4

A. ORTHOGRAPHIC PROJECTIONS :

From a given pictorial view, Sectional orthographic projections i.e. Full, Half, Partial, revolved and removed surfaces.

5 Hours.

UNIT - 5

A. ISOMETRIC PROHECTIONS :

B. INTERPRETATION OF GIVEN VIEWS :

Reading of a given orthographic projection (View). To draw additional view. To convert either of a view as a sectional or to draw missing view as a sectional.

4 Hours.

Isometric scale, Drawing of isometric view from a given orthographic view with reference to given origin.

5 Hours.

B. INTERSECTION OF SURFACES :

To show lines or curves of intersection of surface when two solids cut or interpenetrate each other. i.e. Prisms, Pyramids, Cylinder, Cone, Sphere etc.

5 Hours.

NOTE :- 1. Theory paper shall be based on the syllabi of Engg. Graphics - I + II.

TERM WORK

Sheet No. 01	:-	Development of Lateral surfaces (4 Example)
Sheet No. 02	:-	Orthographic & Sectional Orthographic.
Sheet No. 03	:-	Isometric Views (2 Examples each)
Sheet No. 04	:-	Missing Views (2 Examples each)
Sheet No. 05	:-	Intersection of surface (2 Examples each)
Sheet No. 06	:-	To the scale drawing of machine elements e.g. Screws, Nuts, Bolts, Shafts, Keys, Couplings, Bushes.

BOOK RECOMMENDED

1. Engg. Graphics by R. V. Mali, & J. B. S. Chaudhari.
2. Elementary Drawing by N. D. Bhatt.
3. Machine Drawing I by N. D. Bhatt.
4. Engg. Graphics by M. L. Dhabhade.

TERM - II

ELEMENTS OF MECHANICAL ENGINEERING

SUB. CODE NO :

EXAMINATION SCHEME

TEACHING SCHEME

THEORY : - 100 MARKS

LECTURES : 4 Hrs/Week

Theory Paper : - 03 Hrs. Duration

PRACTICALS :- 2 Hrs./Week.

Term Work - 25 Marks.

UNIT - 1

(11 Hours)

Fundamental concepts of thermodynamic systems, surrounding & boundary, macroscopic and microscopic view point. Concept of Continuum thermodynamic properties, process, cycles, Energy. Heat, specific heat, latent heat, work, power, zeroth law of thermodynamics, temperature and temperature scale, pressure and its measurement. Thermodynamic Equilibrium, units and dimensions.

Principle of conservation of mass and energy, continuity equation. First law of thermodynamics, Joules Experiment, Application of first law of a closed system undergoing a cycle and a change of state, application of first law to steady flow and non flow process and cycles. Concept of internal energy, flow energy and Enthalpy, perpetual motion machine of first kind.

UNIT - 2

(09 Hours)

Ideal gas and processes : Ideal gas definition, Gas, laws, equation of state, specific heat, universal gas constant and gas constant, ideal gas process, constant volume, constant pressure, isothermal, isotropic and adiabatic process, polytropic, throttling process $P - V$ & $T - S$ diagrams. Study of air compressor, air motors, water pump reciprocating and centrifugal, (theoretical study only using schematic diagram.)

UNIT - 3 :

(11 Hours)

Second law of thermodynamics : Limitations of first law, Clausius and Kelvin planks statement, concept of reversibility and reversible cycles, Carnot cycle for heat engine, refrigerator, and heat pump, Carnot theorem, absolute temperature scale.

ENTROPY :

Clausius theorem, Clausius inequality. Entropy concept, changes of entropy of gases during various thermodynamic processes with temperature entropy diagrams.

UNIT - 4 :-

(10 Hours)

Properties of steam : Phase change diagram of formation of steam. Properties of steam table, vapour processes on p-v and T-s diagrams, Dryness fraction and its measurement by calorimeters,

UNIT - 5 :

(10 Hours)

MANUFACTURING PROCESSES :

Foundry : sand founding, types, properties of moulding sand, binders, moulding methods.

Pattern making, materials, types and allowances, casting defects.

Forging : Introduction, types, hand and machine forging.

Welding , types, simple arc welding, oxyacetylene gas welding.

N.E. One question with internal choice only will be asked from each unit.

Term Work

The Term Work shall consist of a record of minimum EIGHT study experiments amongst the list given below.

- 1) Study of Coobran and Lancashire boiler,
- 2) Study of Babcocks and Wilco boiler.
- 3) Study of Boiler mounting and accessories.
- 4) Study of Air Compressor.
- 5) Study of petro engine. (Two stroke & Four stroke)
- 6) Study of Diesel engine. (Two stroke & Four stroke)
- 7) Study of Household refrigerator and room air conditioner.
- 8) Study of lubrication system of I.C. Engine.
- 9) Study of ignition system of two wheeler.
- 10) Study of Single plate clutch, oldham coupling, Hook's Joint.
- 11) Study of Gear drives, chain drive and Belt drives.

REFERENCE BOOKS :

- 1) Engineering Thermodynamics :
by P. K. Nag., Tata McGraw Hill.
- 2) Engineering Thermodynamics :
by Gupta & Prakash / Nemichand and Sons.

- 3) Thermodynamics
by J. R. Bolman / McGraw Hill.
- 4) Thermal Engineering.
by P. G. Ballney / Khanna Publishers, Delhi.
- 5) Workshop Technology : Vol. I
by Haze's Chaudhury / Media Promoters Publications.
- 6) Manufacturing Process :
By M. L. Begman, John Willy Publication.

TERM - II
ELEMENTS OF CIVIL ENGINEERING

SUB. CODE NO :

EXAMINATION SCHEME

TEACHING SCHEME

THEORY : - 100 MARKS

LECTURES : 4 Hrs/Week

Theory Paper : - 03 Hrs. DURATION.

PRACTICALS :- 2 Hrs./Week.

Term Work - 25 Marks.

UNIT - 1 :-

- A) INTRODUCTION :** Civil Engineering it's scope and it's importance in engg. disciplines, Basic concept in major subjects viz, Surveying, Fluid Mechanics, Quantity Sruveying, Soil Mechanics, Environmental Engineering, Water resources Engineering, Structural Engineering, Transportion Engineering etc. Objects, Principles, Purpose of Surveying & Its application, Scale, Representative fraction.
- B) Environmental Engineering :** Causes of pollution of air, water, land, noise & thermal Effect of men, animals, plants of pollutants.
- C) Safety in Construction Work.**

UNIT - II

- A) LINEAR MEASUREMENT :** Direct measurement & Indirect measurement method on plain & sloping ground. Different methods of ranging obstacles in chaining. Introduction to E.D.M. & Remote sensing. Errors and mistakes in chaining chain & tape corrections.
- B) ANGULAR MEASUREMENTS :** Bearing, Compasses used for measurements, Local attraction & Its detection, remedial measures analytical & graphical method. (Bowditch triangle) Dip and Declination of needle.

UNIT - III

- A) **VERTICAL MEASUREMENT** : Definition, Bench Marks, it's types, Levelling, different types, Levelling instruments, Calculation of Reduced level by line of collimation & Rise & Fall Methods.
- B) **CONTOURING** : Contours, Characteristics of contours, Methods of contouring, interpolation, uses & application, Contours for valleys, bills, vertical cliffs etc.
- C) **PLANIMETER** : Study & use of planimeter, computation of areas using planimeter. Zero circle in planimeter.

UNIT - IV

- A) **Type of structures** : Load bearing, framed, composite, Industrial Structures.
- B) **Principles of Planning** : Rules and regulation regarding height of Building, set back, Building line, FSI/ FAR, Areas of rooms etc.
- C) **Sub- structures** :- Foundation and its broad classification, Bearing capacity of soil. Plinth and plinth height causes of failure of foundations and precautions.
- D) **Superstructure** :- Various type of load bearing and partition walls. Types and uses of Doors and windows. Types of Flooring and Roofing, bond in brick work (only one brick thick wall) English and Flemish Bond.)

UNIT - V :

Engineering Properties and uses of scope, Bricks, Lime, cement, tiles, timber, steel, aluminium, rubber, plastic, glass, tar and bitumen, lead, zinc, tin, adhesives, abrasives, mastic and selent, Gypsum, Plaster of paris, Cork, Linoleum, Bakelite, Wall paper etc. concrete and mortar.

PRACTICALS IN ELEMENTS OF CIVIL ENGINEERING

1. Ranging of a line, minimum 100m in length with perpendicular and oblique offsets with location sketches in field book.
2. Observation of Bearings, Adjustment of triangle by analytical method.
3. A project work in chain & compass survey of site not less than 1000 sq. m. and adjustment by Bowditch Method.
4. Levelling by rise & Fall method and collimation Method.
5. A Project work on Block contouring for an area not less than 5000 sq. m.
6. Use of planimeter for computation of area of an irregular figure.

TERM WORK SHALL CONSIST OF

- 1) A field Book with sketches and reading of all practicals.
- 2) Drawing Sheets :

- a) Project on chain & Compass survey.
- b) Project in Block contouring.
- c) Sketches of foundations, English/ flemish Bond one brick thick only, I. S. Symbols, line diagram of two room kitchen blocks. Ecological cycles, etc.

TEXT BOOKS :-

- 1) Surveying & Levelling - Dr. B. C. Punmia.
- 2) Surveying - G. B. Deshpande.
- 3) Building constructions - Rangwala.

REFERENCE BOOKS -

1. Surveying (Vo.I)- Kanetkar, Kulkarni.
- 2) Building Construction - Bindra, Arora.
- 3) Plane surveying- David Clark.

TERM - II

SUBJECT : COMPUTER PROGRAMMING.

SUB. CODE NO :

EXAMINATION SCHEME

TEACHING SCHEME

LECTURES : 01 Hr/ Week

PRACTICALS :- 0 2 Hrs./Week.

Term Work - 25 Marks.

UNIT - 1 :

Algorithms, Flow Charts, Programming Languages, Editors, compiler, Interpreter.

(2 Hours)

UNIT - 2 :

FORTran 77 or C as a structured Language, Constants, Variables and expressions. Input and Output statements, Control Structures. Unconditional conditional statements, Arrays and Control loops, Subprogrammes and Functions.

(4 Hours)

UNIT - 3 -

Memory Utilisation and Built in functions. Files, DOS Commands, Word Processing, Simple programming examples.

(6 Hours)

The student should be demonstrated the use of PC Keyboard, editing and execution of programmes.

PROGRAMMING EXERCISES :

01. Generation of Prime numbers.
02. Sum of Series.

03. Programme to find average of given numbers.
04. programme to find area of a triangle.
05. Sorting an array in ascending or descending order.
06. programme to find largest or Smallest of given numbers.
07. Addition of two matrices.
08. Multiplication of two matrices.
09. Creation and processing of Data File.

The term work should include a minimum of five programming exercises including Listing of the programme and Run on PC.

BOOKS RECOMMENDED :-

1. Programming with FORTran, K. R. Venugopal and H.S. Vimala, Tata McGrwa- Hill.
2. Programming with C.K.R. Venugopal and Sudeep R. Prasad, Tata McGraw- Hill.
3. Programming with C, Gottfried, Tata McGraw Hill.
4. FORTran 77, Third Edition, Davis and Haffman, McGraw- Hill.
5. The C . . . Programming Language, Second Edition, Kernighan and Ritchie, PHI.
6. FORTran 77, Fuori, Gioia, Ganghran, CBS Publishers.
7. Programming with FORTran 77, Dhaliwal, Kumar, Gupta, New Age International (P) Ltd.
8. Principles of Computer Programming, Third Edition.
V. Rajaraman, PHI.
9. Programming with FORTran 77, Ram Kumar, Tata Mcgraw- Hill.
10. Fundamentals of Computers, V. Rajaraman, PHI.

TERM - II

SUBJECT : WORKSHOP PRACTICE - II

SUB. CODE NO :

EXAMINATION SCHEME (F.E. Common)

TEACHING SCHEME

LECTURES : 01 Hr / Week

Term Work - 25 Marks.

PRACTICALS :- 02 Hrs./Week.

WORKSHOP PRACTICE - II

- 1) Study of general purpose m/c tools such as lathe, Drilling m/c Shaping m/c & Milling machine and demonstration on above machines.
- 2) Each candidate shall be required to complete following jobs.
 - a) One job on wood turning lathe involving operations like plain turning, step turning, taper turning, facing, chamfering.
 - b) Welding : One job on gas welding OR Arc Welding with simple joints.
 - c) Brazing & Soldering :- (Tin Smithy)- One job including soldering, riveting operations.
 - d) Plumbing - One job involving operations like bending the rods and welding.

Note :-

- (A) The candidates are required to finish the jobs to the following limits.
 - 1) Machine Shop - + 0.05 mm.
- 0.05 mm.
 - 2) Welding & brazing - 3 mm Linear and one degree angular.
- (B) Workshop book should include description with sketches of all operations of above trades.
- (C) Theory concerning in to be taught in workshop only to every batch going to workshop for practicals.
