

Rashtrasant Tukdoji Maharaj Nagpur University

Direction No.25 of 2012

Direction issued under section 14(8) of the Maharashtra Universities Act, 1994, relating to B.E. 1st Year (Semester Pattern) for the award of Degree of Bachelor of Engineering Full Time in the Faculty of Engineering and Technology.

Whereas, the Maharashtra Universities Act No. XXXV of 1994 has come into force with effect from 22nd July, 1994.

AND

Whereas, the amendment to the said Act came to be effected from 12th September, 2006.

AND

Whereas, the Dean and the Faculty of Engineering and Technology has concurred with the recommendations of the Board of Studies in Applied Science and Humanities, Mechanical Engineering, Civil Engineering and Electrical Engineering in the Faculty of Engineering and Technology on 30th January 2012, 18th February 2012.

AND

Whereas, the Board of Studies in Applied Science and Humanities, Mechanical Engineering, Civil Engineering and Electrical Engineering in the Faculty of Engineering and Technology at its meeting held on 30th April 2012, have decided to make amendment related to First year B.E. in semester pattern for award of degree of Bachelor of Engineering of Full time in the Faculty of Engineering and Technology.

AND

Whereas, the Academic Council in its meeting held on 23rd February, 2012 vide item No. 323 and sub-committee constituted in the meeting of joint Board of Studies in Applied Science and Humanities, Mechanical Engineering, Civil Engineering and Electrical Engineering in the Faculty of Engineering and Technology at its meeting held on 30th January, 2012 and Faculty in its meeting held on 18th February, 2012 have considered and approved the scheme of examination of semester pattern with credit based system for B.E. First year in Faculty of Engineering & Technology and absorption scheme to be implemented from the academic session 2012-13.

AND

Whereas, the Management Council in its meeting held on 11th May,, 2012 vide item No. 101 has considered and approved the scheme of examination of semester pattern with credit based system for B.E. First year in Faculty of Engineering & Technology and absorption scheme to be implemented from the academic session 2012-13.

AND

Whereas, the recommendations made by the Board of Studies in Applied Science and Humanities, Mechanical Engineering, Civil Engineering and Electrical Engineering as approved by the Vice Chancellor pertains to Examination leading to the B.E. First Year (Semester-I and Semester-II) for award of degree of Bachelor of Engineering in the Faculty of Engineering and Technology.

AND

Whereas, it is expedient to provide an Ordinance for the purposes of describing examination in the semester patten leading to the First and Second Semester for award of Degree of Bachelor of Engineering in the Faculty of Engineering and Technology, indicating there in the syllabus and scheme of examination including absorption scheme and award of Grades.

AND

Whereas, an Ordinance is in existence for the award of the degree with yearly pattern scheme and the same is now changed in to semester pattern scheme and this could be done only by way of making amendment to the concerned ordinance and seems making of amendment to the concerned ordinance is time consuming process and it is not possible to make amendment in the time limit.

Now, therefore, I , Dr. V.S. Sapkal, Vice Chancellor of Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur in exercise of powers vested in me under section 14(8) of the Maharashtra Universities Act, 1994, do hereby issued the following Direction pertaining to the amendment as made for semester-I and Semester – II for award of Bachelor of Engineering, in the Faculty of Engineering and Technology.

1. This Direction shall be called "Direction regarding Semester Pattern Scheme and Examination leading to B.E. First Year(Semester I and Semester II) to the Degree of Bachelor of Engineering in the Faculty of Engineering and Technology Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur.

- Subject to the compliance with the provisions of this Direction and any other Ordinance which is in force from time to time shall be applicable
- The Scheme of Examination for Semester-I and Semester – II shall be as mentioned in the Table below –

**SCHEME OF EXAMINATION FOR
B.E. FIRST YEAR (All Branches of Engineering)
(SEMESTER – I)**

Sr. No.	Sub. Code	Subject	Work load				Credit				Marks				
			L	P	T	Total	L	P	T	Total	Theory		Practical		Total Marks
											Sessi- onal	Univ.	Sessi- onal	Univ.	
1.	BESI-1	Applied Mathematics – I	4	-	1	5	4	-	1	5	20	80	-	-	100
2.	BESI-2	Engineering Physics	2	2	1	5	2	1	1	4	10	40	25	25	100
3.	BESI-3	Engineering Chemistry	2	2	1	5	2	1	1	4	10	40	25	25	100
4.	BESI-4	Basic Electrical Engineering	2	2	1	5	2	1	1	4	10	40	25	25	100
5.	BESI-5	Basic Civil Engineering	2	-	1	3	2	-	1	3	10	40	-	-	50
6.	BESI-6	Engineering Graphics – I	2	2	1	5	2	1	1	4	10	40	25	25	100
7.	BESI-7	Communication Skills	-	2	-	2	-	2	-	2	-	-	25	25	50
8.	BESI-8	Computational Skills	-	2	-	2	-	2	-	2	-	-	25	-	25
Total			14	12	06	32	14	08	06	28	70	280	150	125	625

Note:

- Communication Skill shall be taught by a qualified and competent teaching faculty and shall be assigned to the Board of Studies of Applied Sciences and Humanities.
- Computational Skill shall be taught by a qualified and competent teaching faculty and shall be assigned to the Board of Studies of CS/CT/IT/CSE.
- The students of B.E. Second Year Direct Admission (Diploma Holder) old pattern should be exempted from Applied Mathematics – I.
- The Students of B.E. Part time should also be exempted from Applied Mathematics - I.

**SCHEME OF EXAMINATION FOR
B.E. FIRST YEAR (All Branches of Engineering)
(SEMESTER – II)**

Sr. No.	Sub. Code	Subject	Work load				Credit				Marks				
			L	P	T	Total	L	P	T	Total	Theory		Practical		Total Marks
											Sessi-onal	Univ.	Sessi-onal	Univ.	
1.	BESII-1	Applied Mathematics – II	4	-	1	5	4	-	1	5	20	80	-	-	100
2.	BESII-2	Advanced Physics	2	2	1	5	2	1	1	4	10	40	25	25	100
3.	BESII-3	Materials Chemistry	2	2	1	5	2	1	1	4	10	40	25	25	100
4.	BESII-4	Engineering Mechanics	2	2	1	5	2	1	1	4	10	40	25	25	100
5.	BESII-5	Advanced Electrical Engineering	2	-	1	3	2	-	1	3	10	40	-	-	50
6.	BESII-6	Engineering Graphics – II	-	2	1	3	-	2	1	3	-	-	25	25	50
7.	BESII-7	Workshop	-	2	-	2	-	2	-	2	-	-	25	25	50
8.	BESII-8	Ethical Sciences	2	-	-	2	2	-	-	2	50	-	-	-	50
Total			14	10	06	30	14	07	06	27	110	240	125	125	600

Note:

1. Ethical Sciences shall be taught by a qualified and competent teaching faculty from Social Sciences and shall be assigned to the Board of Studies in Applied Sciences and Humanities.
2. The students of B.E. Second Year Direct Admission (Diploma Holder) old pattern should be exempted from Applied Mathematics - II.
3. The Students of B.E. Part time should also be exempted from Applied Mathematics - II.
4. Absorption Scheme for yearly to semester pattern for B.E. First Year all courses shall be as mentioned in the table below :

Scheme of Absorption for Yearly to Semester Pattern of First Year B.E. Engineering

(All Courses)

As Per RTM Nagpur University Yearly Pattern Scheme				As Per RTM Nagpur University Semester Pattern Scheme			
Semester – I							
Sr. No.	Subject Code	Subject	Th / Pr		Subject Code	Subject	Th / Pr
1	CHUEMTN-1	Engineering Mathematics – I	Theory		BESI-1	Applied Mathematics – I	Theory
2	CHUEMTN-3T	Applied Physics	Theory		BESI-2T	Engineering Physics	Theory
3	CHUEMTN-3P	Applied Physics Laboratory	Practical		BESI-2P	Engineering Physics laboratory	Practical
4	CHUEMTN-4T	Applied Chemistry	Theory		BESI-3T	Engineering Chemistry	Theory
5	CHUEMTN-4P	Applied Chemistry Laboratory	Practical		BESI-3P	Engineering Chemistry laboratory	Practical
6	CHUEMTN-9T	Electrical Engineering	Theory		BESI-4T	Basic Electrical Engineering	Theory
7	CHUEMTN-9P	Electrical Engineering Laboratory	Practical		BESI-4P	Basic Electrical Engineering laboratory	Practical
8	CHUEMTN-5	English	Theory		BESI-7	Communication Skill Laboratory	Practical
9					BESI-8	Computational skill	Practical
10					BESI-5	Basics of Civil Engineering	Theory
11	CHUEMTN-8T	Engineering Drawing	Theory		BESI-6T	Engineering Graphics-I	Theory
12	CHUEMTN-8P	Engineering Drawing Laboratory	Practical		BESI-6P	Engineering Graphics-I	Practical
Semester - II							
Sr. No.	Subject Code	Subject	Th / Pr		Subject Code	Subject	Th / Pr
1	CHUEMTN-2	Engineering Mathematics – II	Theory		BESII-1	Applied Mathematics – II	Theory
2	CHUEMTN-3T	Applied Physics	Theory		BESII-2T	Advanced Physics	Theory
3	CHUEMTN-3P	Applied Physics Laboratory	Practical		BESII-2P	Advanced Physics Laboratory	Practical
4	CHUEMTN-4T	Applied Chemistry	Theory		BESII-3T	Materials Chemistry	Theory
5	CHUEMTN-4P	Applied Chemistry Laboratory	Practical		BESII-3P	Materials Chemistry Laboratory	Practical
6	CHUEMTN-7T	Engineering Mechanics	Theory		BESII-4T	Engineering Mechanics	Theory
7	CHUEMTN-7P	Engineering Mechanics Laboratory	Practical		BESII-4P	Engineering Mechanics Laboratory	Practical
8	CHUEMTN-6	Social Science	Theory			Ethical Sciences	Theory
9					BESII-8	Advanced Electrical Engineering	Theory
10	CHUEMTN-10	Workshop	Practical		BESII-7	Workshop	Practical
11	CHUEMTN-8P	Engineering Drawing Laboratory	Practical		BESI-6P	Engineering Graphics-I	Practical

The following note will be applicable after implementation of semester pattern.

Note-a) The students of B.E.II year direct admission (Diploma Holder) of old pattern should be exempted from Applied Mathematics - I and II.

b) The students of B.E .Part time should also be exempted from Applied Mathematics - I and II.

4. The A.T.K.T. Rules shall be same as per the existing provisions in which First Year B.E. shall be read as First and Second Semester.
5. (i) The Scope of subject shall be as indicated in the syllabus
(ii) The medium of instruction and examination shall be English
6. The provisions of Ordinance no. 7(a) relating to "condonation of deficiency of marks" for passing an examination and of Ordinance no. 10 as amended up-to-date relating to "exemptions and compartments" shall apply to the examination under this Ordinance.
7. An Examinee who does not pass or who fails to present himself/ herself for the examination shall be eligible for readmission to the same examination, on payment of a fresh fee and such other fees as may be prescribed from time to time. However, readmission to semester should be allowed only when a regular sessions is running for a particular semester.
8. The computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) of an examinee shall be implemented progressively as from the academic session 2012-13 onwards.

The marks will be allotted in all examinations which will include college assessment marks and the total marks for each Theory / Practical shall be converted into Grades as per Table II.

SGPA shall be calculated based on Grade Points corresponding to percentage of marks as given in Table II and the Credits allotted to respective Theory / Practical shown in the scheme for respective semester.

9. SGPA shall be computed for every semester and CGPA shall be computed only in VIII semester. The CGPA of VIII semester shall be calculated based on SGPA of VII and SGPA of VIII semester as per following computation :-

$$SGPA = \frac{C1 \times G1 + C2 \times G2 + \dots + Cn \times Gn}{C1 + C2 + \dots + Cn}$$

Where C1 = Credit of individual Theory / Practical

G1 = Corresponding Grade Point obtained in the respective Theory / Practical.

$$CGPA = \frac{(SGPA)_{VII} \times (Cr)_{VII} + (SGPA)_{VIII} \times (Cr)_{VIII}}{(Cr)_{VII} + (Cr)_{VIII}}$$

Where (SGPA)_{VII} = SGPA of VII Semester

(Cr)_{VII} = Total Credits for VII Semester

(SGPA)_{VIII} = SGPA of VIII Semester

(Cr)_{VIII} = Total Credits for VIII Semester

CGPA equal to 6.00 and above shall be considered as equivalent to First Class which shall be mentioned on Grade Card of VIII Semester as a foot note.

TABLE II

THEORY

Grade	Percentage of Marks	Grade Points
AA	80 ≤ Marks ≤ 100	10
AB	70 ≤ Marks < 80	9
BB	60 ≤ Marks < 70	8
BC	55 ≤ Marks < 60	7
CC	50 ≤ Marks < 55	6
CD	45 ≤ Marks < 50	5
DD	40 ≤ Marks < 45	4
FF	00 ≤ Marks < 40	0
ZZ	Absent in Examination	—

PRACTICAL

Grade	Percentage of Marks	Grade Points
AA	85 ≤ Marks ≤ 100	10
AB	80 ≤ Marks < 85	9
BB	75 ≤ Marks < 80	8
BC	70 ≤ Marks < 75	7
CC	65 ≤ Marks < 70	6
CD	60 ≤ Marks < 65	5
DD	50 ≤ Marks < 60	4
FF	00 ≤ Marks < 50	0
ZZ	Absent in Examination	—

10. As soon as possible, after the examination the Board of Examinations shall publish a list of successful examinees.
11. I, further direct that the aforesaid Direction shall come into force from the date of issuance and shall remain in force till the relevant Ordinance comes into being in accordance with the provisions of Maharashtra Universities Act, 1994 and the relevant provisions published by this Direction shall be physically repealed from the existing Ordinance.

Nagpur

Date: 22/6/2012

Sd/-
(Dr.V.S. Sapkal)
Vice Chancellor

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Proposed Scheme of Absorbtion for Yearly to Semester Pattern of First Year B.E. Engineering (All Courses)

As Per RTM Nagpur University Semester Pattern Scheme

Semester - I

Sr. No.	Subject Code	Subject	Th / Pr
1		Applied Mathematics - I	Theory
2		Engineering Physics	Theory
3		Engineering Physics laboratory	Practical
4		Engineering Chemistry	Theory
5		Engineering Chemistry laboratory	Practical
6		Basic Electrical Engineering	Theory
7		Basic Electrical Engineering laboratory	Practical
8		Communication Skill Laboratory	Theory
9		Computational skill	Practical
10		Basics of Civil Engineering	Theory
11		Engineering Graphics-I	Theory
12		Engineering Graphics-I	Practical

Semester - II

Sr. No.	Subject Code	Subject	Th / Pr
1		Applied Mathematics - II	Theory
2		Advanced Physics	Theory
3		Advanced Physics laboratory	Practical
4		Materials Chemistry	Theory
5		Materials Chemistry laboratory	Practical
6		Engineering Mechanics	Theory
7		Engineering Mechanics laboratory	Practical
8		Ethical Sciences	Theory
9		Advanced Electrical Engineering	Theory
10		Workshop	Practical
11		Engineering Graphics-I	Practical

As Per RTM Nagpur University YearlyPattern Scheme

Subject Code	Subject	Th / Pr
CHUEMTN-1	Engineering Mathematics - I	Theory
CHUEMTN-3	Applied Physics	Theory
CHUEMTN-3	Applied Physics laboratory	Practical
CHUEMTN-4	Applied Chemistry	Theory
CHUEMTN-4	Applied Chemistry laboratory	Practical
CHUEMTN-9	Electrical Engineering	Theory
CHUEMTN-9	Electrical Engineering laboratory	Practical
CHUEMTN-5	English	Theory
CHUEMTN-8	Engineering Drawing	Theory
	Engineering Drawing laboratory	Practical

Subject Code	Subject	Th / Pr
CHUEMTN-2	Engineering Mathematics - II	Theory
CHUEMTN-3	Applied Physics	Theory
CHUEMTN-3	Applied Physics laboratory	Practical
CHUEMTN-4	Applied Chemistry	Theory
CHUEMTN-4	Applied Chemistry laboratory	Practical
CHUEMTN-7	Engineering Mechanics	Theory
CHUEMTN-7	Engineering Mechanics laborator	Practical
CHUEMTN-6	Social Science	Theory
CHUEMTN-10	Workshop	Practical
	Engineering Drawing laboratory	Practical

The following note will be applicable after implementation of semester pattern

Note-a) The students of B.E.II year direct admission (Diploma Holder) of old pattern should be exempted from applied mathematics.

b)The students of B.E.Part time should also be exempted from applied mathematics.

As Per RTM Nagpur University Yearly PatternScheme

Sr. No.	Subject Code	Subject	Th / Pr
1	CHUEMTN-1	Engineering Mathematics - I	Theory
2	CHUEMTN-2	Engineering Mathematics - II	Theory
3	CHUEMTN-3	Applied Physics	Theory
4	CHUEMTN-3	Applied Physics laboratory	Practical
5	CHUEMTN-4	Applied Chemistry	Theory
6	CHUEMTN-4	Applied Chemistry laboratory	Practical
8	CHUEMTN-5	English	Theory
7	CHUEMTN-6	Social Science	Theory
11	CHUEMTN-7	Engineering Mechanics	Theory
12	CHUEMTN-7	Engineering Mechanics laboratory	Practical
9	CHUEMTN-8	Engineering Drawing	Theory
10	CHUEMTN-8	Engineering Drawing laboratory	Practical
13	CHUEMTN-9	Electrical Engineering	Theory
14	CHUEMTN-9	Electrical Engineering laboratory	Practical
15	CHUEMTN-10	Workshop	Practical

**SCHEME OF EXAMINATION FOR
B.E. FIRST YEAR (All Branches of Engineering)
(SEMESTER – I)**

Sr. No.	Subject	Work load				Credit				Marks				
		L	P	T	Total	L	P	T	Total	Theory		Practical		Total Marks
										Sessional	Univ.	Sessional	Univ.	
1.	Applied Mathematics I	4	-	1	5	4	-	1	5	20	80	-	-	100
2.	Engineering Physics	2	2	1	5	2	1	1	4	10	40	25	25	100
3.	Engineering Chemistry	2	2	1	5	2	1	1	4	10	40	25	25	100
4.	Basic Electrical Engineering	2	2	1	5	2	1	1	4	10	40	25	25	100
5.	Basic Civil Engineering	2	-	1	3	2	-	1	3	10	40	-	-	50
6.	Engineering Graphics – I	2	2	1	5	2	1	1	4	10	40	25	25	100
7.	Communication Skills	-	2	-	2	-	2	-	2	-	-	25	25	50
8.	Computational Skills	-	2	-	2	-	2	-	2	-	-	25	-	25
	Total	14	12	06	32	14	08	06	28	70	280	150	125	625

Note:

- 1) The diploma holder students seeking admission to direct second year B.E. and B.Sc. students seeking admission to B.E. First year will be exempted from appearing in examinations of Applied Mathematics I and Applied Mathematics II papers.
- 2) The students of B.E. Part time will be exempted from appearing in examination of Applied Mathematics I and Applied Mathematics II papers.

**SCHEME OF EXAMINATION FOR
B.E. FIRST YEAR (All Branches of Engineering)
(SEMESTER – II)**

Sr. No.	Subject	Work load				Credit				Marks				
		L	P	T	Total	L	P	T	Total	Theory		Practical		Total Marks
										Sessional	Univ	Sessional	Univ.	
1.	Applied Mathematics – II	4	-	1	5	4	-	1	5	20	80	-	-	100
2.	Advanced Physics	2	2	1	5	2	1	1	4	10	40	25	25	100
3.	Materials Chemistry	2	2	1	5	2	1	1	4	10	40	25	25	100
4.	Engineering Mechanics	2	2	1	5	2	1	1	4	10	40	25	25	100
5.	Advanced Electrical Engineering	2	-	1	3	2	-	1	3	10	40	-	-	50
6.	Engineering Graphics – II	-	2	1	3	-	2	1	3	-	-	25	25	50
7.	Workshop	-	2	-	2	-	2	-	2	-	-	25	25	50
8.	Ethical Sciences	2	-	-	2	2	-	-	2	50	-	-	-	50
	Total	14	10	06	30	14	07	06	27	110	240	125	125	600

**Engineering and Technology,
R.T.M. Nagpur University, Nagpur.**

Syllabus for B.E. (First Semester)

Applied Mathematics – I (BESI-1)

(Total Credits: 05)

Teaching Scheme

Lectures: 4 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 80 Marks T (I) : 20 Marks

Duration of University Exam. : 03 Hours

UNIT- I: Differential Calculus: (12 Hrs)

Successive Differentiation, Taylor's & Maclaurin's series for one variable, indeterminate forms, Curvature and Radius of curvature, Circle of Curvature.

UNIT- II: Partial Differentiation: (12 Hrs)

Functions of several variables, First and Higher order derivatives, Euler's theorem, Chain rule and total differential coefficient, Jacobians, Taylor's & Maclaurin's series for two variables, Maxima & Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT - III: Matrices (06 Hrs)

Matrix, Inverse of Matrix by adjoint method, Inverse by Partitioning method, Solution of system of linear equations, Rank of Matrix, Consistency of linear system of equations

UNIT - IV: First Order Differential Equations (10 Hrs)

First order & first degree differential equations: Linear, Reducible to linear & Exact differential equations (excluding the case of I. F.).

First order & higher degree differential equations

Application of First order & first degree differential equations to simple electrical circuits

UNIT - V: Higher Order Differential Equations (14 Hrs)

Higher order differential equations with constant coefficients, P. I. by method of Variation of parameters, Cauchy's & Legendres's homogeneous differential equations, Simultaneous differential equations, Differential equations of the type $\frac{d^2y}{dx^2} = f(x)$ and $\frac{d^2y}{dx^2} = f(y)$. Applications of differential equations to Oscillations of a Spring, Oscillatory Electrical Circuits, Deflection of Beams.

UNIT - VI: Complex Numbers

(06 Hrs)

Cartesian & Polar forms of Complex Numbers, Geometrical representation of fundamental operations on complex numbers, De Moivre's theorem, Hyperbolic functions and their inverse, Logarithm of complex number, Separation of real and imaginary parts.

Books Recommended:

1. Higher Engineering Mathematics by B. S. Grewal
2. Applied Mathematics Volume I & II, by J. N. Wartikar
3. Textbook of Engineering Mathematics by Bali, Iyenger (Laxmi Prakashan)

Engineering Physics (BESI-2T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hours

Unit - I: Quantum Mechanics

(10 Hrs)

Plank's Hypothesis, Properties of Photons, Compton Effect, Wave – particle duality, De-Broglie Hypothesis, Matter Waves, Davisson - Germer Experiment; Bohr's Quantization condition.

Unit - II: Wave Packet & Wave Equations

(10 Hrs)

Concept of Group and phase velocities, Wave packet, Heisenberg's uncertainty principle, Thought experiment on single slit electron diffraction, Wave function and its probability interpretation, Schrödinger's Time dependent & time independent equations, Solution of Schrödinger's equation for one dimensional infinite potential well, Barrier Tunneling.

Unit - III: Crystal Structure

(08 Hrs)

Crystal structure, Meaning of lattice and basis, Unit cell: primitive and non primitive unit cell; Cubic crystal structure: Body and Face centered cubic structures, SC, BCC and FCC unit cells. Unit cell characteristics: Effective number of atoms per unit cell, atomic radius, nearest neighbor distance, coordination number, atomic packing fraction, void space, density; Crystal planes and Miller indices, Inter-planar distance between adjacent planes, Bragg's law of X-ray diffraction, Tetrahedral and octahedral voids.

Unit - IV: Semiconductor Physics

(12 Hrs)

Qualitative idea on the formation of electron energy bands in solids, Band-theory based classification of solids into insulators, semiconductors and conductors, Fermi-Dirac distribution Function, Intrinsic semiconductors: Germanium and silicon; Fermi- energy, Typical energy band diagram of an intrinsic semi-conductor, Doping and Extrinsic semiconductors, Current conduction in semiconductors.

PN- junction diode; Unbiased, Forward biased & Reverse biased mode with Energy band diagram reference, Diode rectifier equation, Bipolar Transistor action, Hall effect, Hall coefficient & Hall

Angle, V-I characteristics of i) Tunnel diode, ii) Zener diode iii) LED.

Books Recommended:

Text Books:

- Fundamentals of Physics: David Halliday, Robert Resnick and Jerle Walker, (John-Wiley India, 8e, extended)
- Electronic Engineering Materials and Devices: John Allision, (TMH edition, 10th reprint)
- Engineering Physics: M. N. Avadhanulu, (S. Chand & Co.)
- Concepts of Modern Physics: Baiser (Tata McGraw Hill).

Reference Books:

- University Physics: Young and Freedman (Pearson Education)
- Solid State Physics: C. Kittel
- Solid State Physics: R.L. Singhal
- Quantum Mechanics: Schiff

Engineering Physics (BESI-2P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks

P (I) : 25 Marks

Duration of University Exam. : 03 Hours

List of Experiments in Engineering Physics:

1. Elementary analytical techniques: Method of linear least squares fit to the experimental data, error estimation, calculations involving idea of significant figures.
2. Determination of band gap (A thermistor or p-n junction diode may be used.)
3. V-I characteristics of Semiconductor diodes.
4. V-I characteristics of Zener diodes.
5. Input, output and current transfer characteristics of PNP/NAN transistor in CB and CE mode.
6. Study of Hall Effect.
7. Variation of Hall coefficient (RH) with temperature.
8. V-I Characteristics of Tunnel Diode.
9. Study of LED.
10. Study of Diode as a rectifier.

Note: Performance of at least six experiments is compulsory in a semester.

Engineering Chemistry (BESI-3T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hours

Unit – I: Water Technology

(12 Hrs)

Hardness of water and types of hardness

Domestic water treatment: Brief discussion of coagulation and sterilization using UV. Ozone, chlorine, Break point chlorination.

Softening of water-principle, reactions, advantages, limitations and Comparison of – Lime-Soda process, Zeolite process, and de-mineralization process.

Boiler Troubles-(causes, effect on boiler operation and methods of prevention) – Carry over-priming and foaming; Scales and sludges, caustic embrittlement, boiler corrosion; internal conditioning-phosphate, carbonate, calgon conditioning.

Numericals based on lime-soda and Zeolite process.

Desalination-using electro dialysis and reverse osmosis processes.

Waste water treatment (introduction and importance) – Brief idea about tertiary treatment methods.

Unit – II: Corrosion Science

(10 Hrs)

Introduction, Causes and Consequence of corrosion, brief idea about electrochemical & galvanic series, Factors influencing corrosion) Nature of metal b) Nature of environment, Chemical and electrochemical corrosion, Mechanisms of electrochemical corrosion; Pilling Bed worth rule; Differential aeration theory of corrosion.

Types of Corrosion – Pitting, inter granular, stress, waterline and galvanic corrosion.

Corrosion Prevention – a) Design and material selection b) Cathodic and anodic protection, c) Protective surface coatings- tinning, galvanizing and powder coating, metal cladding and electroplating.

Unit – III: Construction Materials

(08 Hrs)

Cement: Portland cement – Raw material, Dry and wet process of manufacture, Proportion and role of microscopic constituents, Additives of cement, Setting and hardening of cement; heat of hydration, soundness; Types of cement (characteristics & applications) – White, High alumina, Low heat, Rapid hardening cement, Ready Mix Concrete, fly ash as cementing material(properties, advantages, limitations & application)

Unit – IV: Green Chemistry and Battery Technology

(10 Hrs)

Green Chemistry: Introduction, Principles and significance, industrial application (supercritical fluids as Solvents, Example-super critical CO₂), Biocatalysis and concept of carbon credits.

Battery Technology: Types of batteries, primary, secondary and reverse batteries, important definition-energy density, power density.

a) Secondary Battery: Lithium ion, Nickel-Cadmium b) Fuel cell application, advantages and limitation (Example: Alkaline fuel Cell).

Books Recommended:

Text Books:

1. Text Book of Engineering Chemistry: S.S. Dara, S. Chand and Company Ltd. New Delhi.
2. Engineering Chemistry: Arty Dixit Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.
3. Textbook of Engineering Chemistry: P.C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
4. Textbook of Engineering Chemistry: S.N. Narkhede, R.T. Jadhav, AB. Bhake, A.U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry: A.V. Bharati and Walekar, Tech Max Publications, Pune.

Reference Books:

1. A Text book of Engineering Chemistry : Shashi Chawla; Dhanpat Rai & Sons, New Delhi.
2. A textbook of Polymer Science : Fred, Billmeyer Jr. ,Wiley India Third edition.
3. Applied Chemistry by N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian TMH
4. Applied Chemistry for Engineers : T.S. Gyngell.
5. Chemistry of Advanced Materials : CNR Rao, Rsc Publication.

6. Chemistry of Engineering Materials: Robert B Leighou Mc Graw – Hill Book Company, Inc New York
7. Engineering Materials: Kenneth G Budinski (Prentice – Hall of India)
8. Fuels and Combustion by Amir Circar, Orient Longmans
9. Fundamentals of Engineering Chemistry (Theory and Practice) :S. K. Singh (New Age Materials
10. Materials Science and Engineering an Introduction, William D. Callister, (Jr. Wiley publisher).
11. Fundamentals of Corrosion : Michael Henthorne, Chemical Engineering.
12. Water Treatment : F. I. Bilane, Mir publisher

Engineering Chemistry (BESI-3P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks

P (I) : 25 Marks

Duration of University Exam. : 03 Hours

List of Experiments-Any Eight experiments should be performed out of the following :

1. Determination of temporary and permanent hardness of water by complexometry method.
2. To estimate the amount of Ni^{+2} ions in a given solution by complexometric method.
3. Estimation of Free chlorine in the water by iodometry.
4. Type and extent of alkalinity by Warder's method.
5. Estimation of dissolved oxygen in a water sample.
6. Determination of capacity of anion exchange resin.
7. Determination of capacity of cation exchange resin.
8. Determination of Copper by Iodometry
9. To estimate the amount of ferrous and ferric ions present in the given solution or from ore.
10. Determination of hardness of water due to calcium and magnesium ions separately.
11. Determination of heat of neutralization.
12. Determination on rate of corrosion by weight loss by corrossometer.
13. Study of charging of lead acetate battery by measuring density of sulphuric acid electrolyte.
14. Determination of pH of waste water.
15. Verification of Beers Law.
16. Determination COD in waste water.
- 17.

Laboratory Manual:

1. Applied Chemistry theory and practical O.P. Virmani and A.K.Narular (New Age International).
2. Laboratory Manual on Engineering Chemistry by Dr. Subdharani (Dhanpat Rai Publishing)
3. A Textbook on experiment and calculation in engineering chemistry by S.S. Dara S.Chand
4. Inorganic quantitative analysis, Vogel. (Prentice Hall).

Basic Electrical Engineering (BESI- 4T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hours

Unit – I: Electric Circuits

(10Hrs)

EMF, Potential difference, current, power, Energy (Definition & Units SI), Ohms Law, types of sources (Current & Voltage), Ideal and Practical Sources (Independent Sources only), Source Conversion, Superposition theorem with DC source.

Circuit element resistance, factors affecting resistance, series & parallel combination of resistances, Kirchhoff's Laws (KVL, KCL) statement & Numerical, star Delta transformation, Circuit Element Inductance, Self and Mutual Inductance, Circuit Element Capacitance.

Unit – II: Magnetic Circuits

(8Hrs)

Types of Magnetic Materials, flux, flux density, flux intensity, MMF, reluctance, permanence, permeability, analogous electric circuit, calculation for composite magnetic circuit, concept of leakage flux and fringing, B-H curve, phenomena of magnetic hysteresis.

Unit - III: AC Circuits

(12Hrs)

Generation of single phase voltage, average and RMS value for sinusoidal waveform, periodic function, phasor representation of sinusoidal electrical quantities, steady state behavior of RLC circuit with excitation, reactance, impedance, power and energy in AC circuit, simple numerical on series and parallel AC circuit, concept and importance of power factor, resonance in series circuits.

Principal of Generation of three phase voltage, Phase sequence, Star & Delta Connected three phase system, Voltage, Current & Power relations for Balanced three phase system only (With numericals).

Unit – IV :Single Phase Transformer

(10Hrs)

Basic construction of Transformer (core & shell type), Principle of operation, EMF equation, Transformer ratings, No load & On load operation with leakage reactance, losses, efficiency, Definition & formula for voltage regulation, OC & SC test, equivalent circuit of the Transformer.

Books Recommended:

- 1) Basic Electrical Engineering: D.C. Kulshreshtha, Revised 1st edition, Tata Mc-Graw Hill Education Pvt. Ltd.
- 2) A Text Book of Electrical Technology: B. L. Thareja and A. K. Thareja, S. Chand Publication (Volume I, II & III).
- 3) Generation of Electrical Energy: B. R. Gupta 4th Edition, S Chand Publication
- 4) Art & Science of Utilization of Electrical Energy: H. Pratab, Third Edition, Dhanpat Rai and Sons.
- 5) Electric Circuits & Network: K. Suresh Kumar, Pearson Publication.

Basic Electrical Engineering (BESI-4P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks

P (I) : 25 Marks

Duration of University Exam. : 03 Hours

Minimum 08 experiments based on the theory.

Basics of Civil Engineering (BESI-5T)

Total Credits: 03

Teaching Scheme

Lectures: 2 Hours/Week

Tutorial: 1 Hour/Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hours

Unit –I:

(10 Hrs)

Introduction to Civil Engineering

Introduction and scope of Civil Engineering. Role of Engineers in the infrastructure development.

General concepts related to building.

Selection of site, basic functions of buildings, types of buildings – Residential, Public, Commercial, and Industrial.

Principles of planning, orientation of buildings, introduction to bye-laws regarding building line,

Height of building, open space requirement, F.S.I., Carpet area, built up area, setbacks, ventilation.

Components of Buildings

Introduction to Types of loads on buildings.

Substructure – Types of soils; rocks and foundation strata, concept of bearing capacity, Types of foundation and their suitability.

Superstructure –Types of construction: Load Bearing, Framed, and Composite.

Building Materials

Introduction to basic construction materials; cement, bricks, stone, aggregates, reinforcing steel, structural glazing, structural steel; Concrete types: PCC, RCC, Prestressed, Precast and Ready Mix Concrete.

Use of various eco- friendly materials in construction.

Unit – II:

(10 Hrs)

Surveying

Various types of maps and their uses; Introduction to digital mapping; Principles of survey.

Introduction to various survey instruments such as EDM, Lasers, Total Station, and digital

planimeter. Modern survey methods. Introduction to GIS, GPS and their applications.

Transportation Engineering

Role of transportation in national development; Various modes of Transportation.

Classification of Highways: Expressways, NH, SH, MDR, ODR, VR; Types of Pavements, Traffic Signs, signals, Parking system, and Causes of Accidents.

Unit –III:

(10 Hrs)

Environment and Natural Resource Management

Water supply - Sources, drinking water requirements, impurities in water and their effects;

Purification of water, modern purification processes; Standards of purified water.

Waste Management: Collection and Disposal methods of Liquid, solid and gaseous wastes.

Water Resources Engineering

Introduction to Hydraulic structures of storage; water conveyance systems;

Watershed management: Definition, Necessity and methods;

Roof top rain water harvesting and Ground water recharge: relevance and methods.

Unit –IV:

(10 Hrs)

Instrumentation in Civil Engineering Structures:

Various Instruments used in construction, water resources, Environmental Engineering,

Foundation Engineering, Thermocouples, condition monitoring equipments, Half Cell

Potentiometers, Strain Gauges.

Management of Utilities using telemetry & SCADA System.

Sustainable Development:

Role of Engineers in Sustainable Development. Concept of green buildings and LEED Certification.

[**Note:** Minimum 4 Assignments based on the Syllabus]

Books Recommended:

1. Elements of Civil Engineering:By S. S. Bhavikatti
2. Basic Civil Engineering:By Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain.
3. Concrete Technology:By M.S.Shetty

- 4.** Surveying And Levelling:By Kanetkar and Kulkarni
- 5.** Irrigation And Hydraulic Structures:By S.K.Garg
- 6.** Water Supply And Sanitary Engineering: Including Environmental Engineering, Water And Air Pollution Laws And Ecology:By G. S. Birdie, J. S. Birdie
- 7.** Building Construction:By Sushil Kumar
- 8.** Transportation Engineering:By Khanna & Justo
- 9.** Building Drawing Design:By Shah and Kale
- 10.** Construction Planning ,Equipments And Methods:Robert Peurifoy, Clifford J. Schexnayder, Aviad Shapira and Robert Schmitt

Engineering Graphics – I (BESI-6T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/Week

Tutorial: 1 Hour/Week

Examination Scheme

Theory

T(U) : 40 Marks

Duration of University Paper

T(I) : 10 Marks

: 03 Hours

UNIT – I:

(08 Hrs)

Introduction to Engg. Drawing & Curves used in Engineering Practice

Introduction , Use of various drawing instruments, lettering, Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension. Introduction to scales & scale factor (RF).

Conic sections - Ellipse, Parabola, Hyperbola, (No Directrix – Focus Method), Cycloid, Involute & Archimedean Spiral.

Basics of Orthographic Projections

Basic principles of orthographic projection, reference planes, concepts of four quadrants, methods of orthographic projections – First angle projections, Third angle projections, conventions used to represent methods of orthographic projection.

Projections of Points and Lines

Projections of points in all possible positions w.r.t. reference planes, projections of lines when it is perpendicular to one of the reference planes, when line is inclined to one & parallel to other reference plane, lines inclined to both reference planes. (Lines in First Quadrant Only), simple problems on straight lines.

UNIT – II

(08 Hrs)

Projections of Planes

Projection of planes when it is parallel to one of the reference planes, lying in reference plane, when it is perpendicular to one & inclined to other reference plane, when it is inclined to both reference planes.

Use of Auxiliary Plane method for solving the problems.

Projections of Solids

Projections of solids when axis is perpendicular to one of the reference planes , when axis is inclined to one & parallel to other reference plane, when axis is inclined to both the reference planes, projections of cube, right regular prisms, right regular pyramids, right circular cylinder, right circular cone, tetrahedron.

UNIT – III

(07 Hrs)

Orthographic Projections

Conversion of pictorial view into orthographic views.

UNIT – IV

(07 Hrs)

Isometric Projections

Definition of Isometric view/projection, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of Isometric view from given orthographic views and to construct Isometric view of combined two simple solids (axes vertical & coinciding) such as Cube, Pyramid, Prism, Cone, Cylinder & Sphere.

(NOTE – ONLY FIRST ANGLE METHOD OF PROJECTIONS SHOULD BE USED)

Books Recommended:

Text Books:

1. N.D. Bhatt: Elementary Engineering Drawing, Charotar Publishing house, Anand, India.
2. A. R. Bapat: Engineering Graphics, Allied Publishers, New Delhi
3. D. N. Johle,:Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
4. M.B. Shah:B.C. Rana, Engineering Drawing, Pearson
5. Pakhatkar:Engg. Drawing, Nirali Prakashan.
6. P J. Shah:Text Book of Engineering Drawing,S Chand & Publications

Reference Books:

1. P.S. Gill: Engineering Graphics.
2. Luzadder Warren J, Duff John: Fundamentals of Engineering Drawing,PHI Publications
3. N.D. Bhatt: Machine Drawing, Charotar Publishing house, Anand, India.

Engineering Graphics – I (BESI-6P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks

P (I) : 25 Marks

Duration of University Exam. : 03 Hours

PRACTICALS:

SIX A2 (594X420mm) (Half imperial) size drawing sheets as detailed below:

Sheet No. 1 : **Curves**

To draw any four curves mentioned in the syllabus.

Sheet No. 2 : Projection of Lines (Minimum four problems)

Sheet No. 3 : Projection of Planes (Minimum four problems)

Sheet No. 4 : Projections of solids (Minimum four problems)

Sheet No. 5 : **Orthographic Views**

To draw orthographic views from given pictorial view (Minimum four problems. Two of which should be free hand sketching)

Sheet No. 6 : **Isometric Views/Projection**

Two problems each on Isometric views & Isometric projections.

Books Recommended:

Text Books:

7. N.D. Bhatt: Elementary Engineering Drawing, Charotar Publishing house, Anand, India.
8. A. R. Bapat: Engineering Graphics, Allied Publishers, New Delhi
9. D. N. Johle, :Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
10. M.B. Shah:B.C. Rana, Engineering Drawing, Pearson

11. Pakhatkar:Engg. Drawing, Nirali Prakashan.

12. P J. Shah:Text Book of Engineering Drawing,S Chand & Publications

Reference Books:

3. P.S. Gill: Engineering Graphics.

4. Luzadder Warren J, Duff John: Fundamentals of Engineering Drawing,PHI Publications

3. N.D. Bhatt: Machine Drawing, Charotor Publishing house, Anand, India.

Communication Skill (BESI-7)

(Total Credits: 02)

Teaching Scheme

Practical: 2 Hours/Week

Examination Scheme

Practical

P (U): 25 Marks **P (I):** 25 Marks

Duration of University Practical: 03 Hours

Following points are to be covered while demonstration of Communication Skill Practicals:

- a) Practical and practice of letter writing: Business, Job and Bank Correspondence.
- b) Technical Report Writing.
- c) Grammar:
 1. Correction of Common Error
 2. Exercise on rewrite as directed
 3. Correct use of words, idioms, phrases, prepositions etc.
- d)
 1. Principles of Public Speaking
 2. Reading Comprehension
- e)
 1. Professional Communication Skill
(Meaning, Significance, Types, Dimensions & Barriers)
 2. Group Discussion (GD) and Personal Interview (PI)
(Importance of GD, Modules of GD, How to prepare for GD; Meaning, Types & Techniques of PI, How to prepare for PI)

Communication Skills Practicals

Sr. No.	NAME OF THE PRACTICAL	ACTIVITY TO BE TAKEN	MEDIUM OF PRACTICAL
1	BARRIER TO COMMUNICATIN	1. intro to various kind of barriers 2. Activity class on semantic barriers	PPT based, Activity Based
2	READING SKILLS	1. Skimming, Scanning & Gist reading 2. Comprehending passages	PPT based, Activity Based

3	DEVELOPMENT OF WORD POWER	1. IPA, Pronunciation techniques 2. Often wrongly pronounced words 3. Word Power, Homophones, Synonyms / antonyms	Software based PPT based, Activity Based
4	NON VERBAL COMMUNICATION	1. Kinesics in com/ interviews 2. Activities /role play	Software based PPT based, Activity Based
5	SPEAKING SKILL	1. Intro of effective way of speaking 2. oral presentations Extempore / Debate / JAM	PPT based, Activity Based
6	GROUP DISCUSSION	1. GD rules 2. GD of groups in 6	Software based PPT based, Activity Based
7	INTERVIEW QUATIONS	1. Various types of Interviews 2. Resume making 3. Mock Interviews (one 2 one)	Software based PPT based, Activity Based
8	USE OF FIGURATIVE LANGUAGE	1. Intro phrases / Idioms/ Proverbs 2. Idioms related to Color/ Number/ Animals/ Part of body/ Misc.	PPT based, Activity Based
9	LISTENING SKILL	Listening Barriers	PPT based, Activity Based
10	PRESENTATION SKILL	1. Preparing visual aids/ PPTs 2. Writing references	PPT based, Activity Based

Books Recommended:

1. Public Speaking and Influencing Men in Business: Dale Carnegie.
2. Professional Communication Skills: Bhatia and Sheikh.
3. Business Communication: K. K. Sinha.
4. Communication Skills: Dr. P. Prasad.
5. Technical Communication: Raman and Sharma.
6. High School Grammar and Composition: Wren and Martin.
7. Modern English Grammar Usage and Composition: N. Krishnaswami.

Computational Skills (BESI-8)

(Total Credits: 02)

Teaching Scheme

Practical: 2 Hours/Week

Examination Scheme

Practical

P (I): 25 Marks

Duration of Internal Practical Exam: 02 Hrs

Practical Slot – 1: Fundamentals of Computers and Operating System

Contents:

- 1) To demonstrate the internal structure of Computer, its assembly, use of each I/O device and ports.
- 2) To demonstrate the use of System Software like: Windows Operating System, Linux Operating System.
- 3) To explain about “C” language Compiler options and C++ language overview.

Practical Slot – 2: Fundamentals of “C” language

Contents:

- 1) To demonstrate all types of operators (Arithmetic, Logical and Relational) of “C” language.
- 2) To demonstrate different data types in “C” language.
- 3) To demonstrate the use of “printf” and “scanf” with all possible options.

Practical Slot – 3: Fundamentals of Decision Control Structures

Contents:

- 1) To demonstrate the use of if-else structure, nested if structure.
- 2) To demonstrate the use of Conditional operators (? Operator).
- 3) To demonstrate the use of Switch.Case construct.

Practical Slot – 4:

Fundamentals of Loop Control Structures

Contents:

- 1) To demonstrate the use of “while” control structure.
- 2) To demonstrate the use of “do..while” control structure.
- 3) To demonstrate the use of “for” control structure.
- 4) To demonstrate the use of “break” and “continue” construct.

Practical Slot – 5 and 6:

Fundamentals of One Dimensional Arrays

Contents:

- 1) To demonstrate the creation of array, addition of an element, deletion of an element and displaying the elements from one dimensional array.
- 2) To demonstrate the implementation of bubble sort, selection sort and insertion sort.
- 3) To demonstrate the implementation of linear search and binary search.

Practical Slot – 7:

Fundamentals of Two Dimensional Arrays

Contents:

- 1) To demonstrate the matrix manipulation operations like addition, multiplication.
- 2) To demonstrate the operations on row and columns of two dimensional matrix.

Practical Slot – 8:

Fundamentals of Pointers

Contents:

- 1) To demonstrate the pointer declaration and its use.
- 2) To demonstrate the implementation of pointer on array.
- 3) To demonstrate the creation of dynamic arrays using pointer.

Practical Slot – 9:

Fundamentals of Strings

Contents:

- 1) To demonstrate the basic operations on string like “length”, “copy”, “reverse”, “truncate”.
- 2) To demonstrate the implementation of two dimensional array of characters.

Practical Slot – 10:

Fundamentals of Functions

Contents:

- 1) To demonstrate the implementation of functions.
- 2) To demonstrate the call by value parameter passing method.
- 3) To demonstrate the call by reference parameter passing method.

Practical Slot – 11:

Fundamentals of Functions

Contents:

- 1) To demonstrate the implementation of recursive function.
- 2) To demonstrate the use of library function (mathematical and string).

Method to conduct the practicals:

Out of the two hours allotted:

- The faculty member will teach the basic concepts of practical to the students for 30 minutes.
- The next 30 minutes will be on how to implement the problem definition of the practical, i.e., algorithm to implement the problem definition.
- The next 1 hour, the students will implement the practical and execute it on computers.

For example:

Fundamentals of Loop Control Structures

Contents:

- To demonstrate the use of “while” control structure.
- To demonstrate the use of “do..while” control structure.
- To demonstrate the use of “for” control structure.
- To demonstrate the use of “break” and “continue” construct.

Cover the concepts of:

- While loop, do..while loop, for loop and break & continue statement.
- Explain the implementation of control structure on practical and LCD projector to students.
- Give one problem definition containing all the concepts of practical and allow students to implement and execute on the computers.

Books Recommended:

1. Herbert Schildt - C Complete Reference (Tata-McGraw Hill)
2. Byron Gottfried," Programming with C", Schaum;s Outline Series .
3. R Venugopal & S R Prasad. "Mastering C" Tata-McGraw Hill-2207.

**Engineering and Technology,
R.T.M. Nagpur University, Nagpur**

Syllabus for B.E. (Second Semester)

Applied Mathematics – II (BESII-1)

(Total Credits: 05)

Teaching Scheme

Lectures: 4 Hours/ Week

Tutorial: 1 Hour / Week

Examination Scheme

Theory

T (U) : 80 Marks T (I) : 20 Marks
Duration of University Exam. : 03 Hours

UNIT - I : Integral Calculus-I

(10 Hrs)

Beta and Gamma functions, Differentiation of definite integral, Mean Value and Root Mean Square Values.

UNIT - II: Integral Calculus-II

(10 Hrs)

Tracing of curves (Cartesian and polar curves), Rectification of simple curves, Quadrature, volume and surface of solids of revolution (Cartesian, polar and parametric forms).

UNIT- III: Multiple Integrals and their Applications

(12 Hrs)

Elementary double integrals, Change of variable (simple transformations), Change of order of integration, (Cartesian and polar), Applications to find Mass, Area, Volume and Centre of Gravity (Cartesian and polar forms), Elementary triple integrals.

UNIT - IV: Vector Differential Calculus

(08 Hrs)

Vector triple product, Product of four vectors, Scalar point function, Vector point Function, Vector differentiation, Gradient, Divergence and Curl, Directional derivatives with their physical interpretation, Solenoidal and irrotational motions.

UNIT- V : Vector Integral Calculus**(10 Hrs)**

Vector integration, Line, Surface and Volume integrals, Statement (without proof) of Stoke's theorem, Gauss divergence theorem and Green's theorem, Simple applications of these theorems.

UNIT - VI:**(10 Hrs)****(A) Statistics**

Fitting of straight line $y = a + bx$, Parabola $y = a + bx + cx^2$ and Exponential curves by method of least squares, Lines of regression and Correlation, Rank correlation.

(B) Finite Differences:

Operator E and Δ , Factorial notations, Lagrange's interpolation formula for unequal intervals, Difference equations with constant coefficients.

Books Recommended:

1. Higher Engineering Mathematics: B. S. Grewal
2. Applied Mathematics Volume I & II: J. N. Wartikar
3. Textbook of Engineering Mathematics: Bali, Iyenger (Laxmi Prakashan)

Advanced Physics (BESII-2T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hrs

Unit - I: Lasers & Wave Optics

(07 Hrs)

Spatial and temporal coherence of a light wave, Quantum Transitions: Absorption, Spontaneous emission & stimulated Emission, Metastable states, Pumping schemes, Principle of laser, Laser characteristics, Components of a laser, Principle & working of He-Ne, Ruby & Semiconductor lasers, Applications.

Interference in thin films, Interference in Wedge shape thin film, Newton's rings, Anti-reflection coating, advanced applications of interference in thin film.

Unit - II: Electron Ballistics

(05 Hrs)

Lorentz force, Motion of charged particles in uniform electric and magnetic fields: parallel, perpendicular and at an acute angle, Effect of electric and magnetic fields on kinetic energy of charged particle, Crossed electric and magnetic field configurations, Velocity filter, Electrostatic and magnetostatic deflection.

Unit - III: Electron Optics

(06Hrs)

Bethe's law, Electric and Magnetic focusing, Construction & working of Electrostatic lens, Devices: CRT, CRO, Block Diagram, Function & working of each block, Bainbridge mass spectrograph, Cyclotron.

Unit - IV: Optical Fiber & Nanoscience

(12Hrs)

Optical fibers: Propagation by total internal reflection, structure and classification (based on material, refractive index and number of modes), Modes of propagation in fiber, Acceptance angle, Numerical aperture, Attenuation and dispersion. Light sources and Detectors.

Applications: I) As a Sensors - i) Temperature Sensor ii) Pollution / Smoke detector iii) Liquid level sensor.

II) As a Detectors- i) PIN detector ii) Avalanche Detector.

Introduction to nanoscience and nanotechnology, Classification of nano materials, Synthesis of Nanomaterials, General idea about physical and chemical methods. e.g; Physical Vapour

Deposition and Sol gel method. Comparison of properties of nanomaterials with bulk materials, Some special nanomaterials:

1) Zeolites, 2) Graphine,

Application of nanomaterials in engineering, Impact of Nanoscience and nanotechnology .

Books recommended:

Text Books:

- Fundamentals of Physics: David Halliday, Robert Resnick and Jerle Walker, John-Wiley India(8e, extended)
- A text book of Engineering Physics: M. N. Avadhanulu, S. Chand & Co.
- Nano The Essentials: Understanding Nanoscience and Nanotechnology, T.Praddep; TMH Publications.
- Introduction to Nanotechnology;Pooly & Owens; Willey Publication
- Text Book of Optics: Brijlal and Subramanyam (S. Chand and Company)
- Laser: M. N. Avadhanulu, S. Chand & Co.

Reference Books:

- LASERS: Theory and Applications: Thyagarajan K and Ghatak A.K.
- Nanomaterials & Nanotechnologies and Design:M.F.Ashby, Paulo Ferreira and Daniel L.Schodek, Elsevier Publications.
- University Physics: Young and Freedman (Pearson Education).
- Optics: Jenkins and White (Tata Mcgraw Hill)

Advanced Physics (BESII-2P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks P (I) : 25 Marks

Duration of University Exam. : 03 Hrs

List of Experiments in Advance Physics:

1. Study of Cathode Ray Oscilloscope.
2. Determination of phase difference and frequency of electrical signals using C.R.O.
3. Interference in thin films: Newton's ring experiment.
4. Laser source: Determination of Wavelength by Diffraction Grating
5. Refractive Index of Transparent liquid By Newton's Rings.
6. Optical fiber: Acceptance angle and numerical aperture determination
7. Study of Double Refraction.
8. Measurement of attenuation in optical fiber.
9. Interference in thin films: Study of wedge shaped thin film.
10. Determination of Refractive Index of Prism.
11. Determination of wavelength of sodium light using diffraction grating.
12. Determination of e/m of an electron.

Note: Performance of at least six experiments is compulsory in a semester.

Materials Chemistry (BESII-3T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hours / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hrs

Unit - I: Energy-I

(10 Hrs)

Fuels: Introduction: Calorific value, Higher and lower calorific value; determination of calorific value by Bomb and Boy's calorimeter; numerical based on calorific value determination;

Solid fuels-significance of proximate and ultimate analysis; numerical (Dulong's formula)

Composition, properties, advantages, limitations and applications of bio-diesel, LPG, CNG

Non-conventional energy sources: General applications advantages and limitations of non-conventional energy sources.

Rocket propellants: Principle and classification of propellants.

Unit – II: Energy-II

(10 Hrs)

Liquid fuels –fractional distillation of crude petroleum(boiling point wise separation only) use of gasoline and diesel in internal combustion engine: knocking and chemical constitution of fuel, Octane and Cetane number, doping agents, fischer-tropsch process for manufacturing synthetic gasoline; cracking of petroleum-principle, types , catalysts used, advantages

Combustion calculations – Numericals based on combustion calculations for solid, liquid and gaseous fuels.

Unit – III: Lubrication

(10 Hrs)

Lubricants- Introduction, mechanisms-Hydrodynamic, boundary and extreme pressure lubrication; Classification-solid, semisolid and liquid lubricants;

Biodegradable lubricants-properties, application, advantages and limitations;

Synthetic lubricants-Silicones ,Lubricating emulsion; Properties of greases-drop point test and consistency test; Properties of liquid lubricants:-Acid value, saponification number, flash and fire point, viscosity and viscosity index, Aniline point, Cloud and Pour Point, Criteria for selection of lubricants-IC engine, refrigeration, gear, transformer, steam turbine, delicate mechanical system.

Unit – IV :Advanced materials

(10 Hrs)

Properties and applications – Biodegradable polymers-polylactic acid (PLA) and Polycaprolactone(PCL).

Conducting polymers – polycetylene, polyaniline. Polypyrrole,

Composite materials-introduction, general classification –Particle reinforced , fibre reinforced, structural and its industrial applications.

Liquid crystal polymers-general properties and application.

Nanomaterials-Definition, nano scale. Carbon nano tubes (CNT)types and difference between Single wall NT, Multi wall NT; applications of nanomaterials in medicine, environment and electronics.

Books Recommended:

Text Books:

1. Text Book of Engineering Chemistry; S.S. Dara, S. Chand and Company Ltd. New Delhi.
2. Engineering Chemistry: Arti Dixit, Dr. Kirtiwardhan Dixit, Harivansh Prakashan, Chandrapur.
3. Textbook of Engineering Chemistry: P.C. Jain and Monica Jain, Dhanpat Rai and Sons, New Delhi.
4. Textbook of Engineering Chemistry: S.N. Narkhede, R.T. Jadhav, AB. Bhake, A.U. Zadgaonkar, Das Ganu Prakashan, Nagpur.
5. Applied Chemistry: A.V. Bharati and Walekar, Tech Max Publications, Pune.

Reference Books:

1. A Text book of Engineering Chemistry : Shashi Chawla; Dhanpat Rai & sons, New Delhi
2. Chemistry in Engineering : Lloyd a. Munro, Prentice-hall, Inc Nj
3. Chemistry of Advanced Materials : CNR Rao, Rsc Pbl'
4. Chemistry of Engineering Materials: Robert B Leighou Mc Graw – Hill Book Company, Inc New York
5. Engineering Materials: Kenneth G Budinski (Prentice – Hall of India)
6. Fuels and Combustion : Amir Circar, Orient Longmans
7. Materials science and engineering an introduction:William D. Callister, (Jr. Wiley publisher)
8. Polymer science and technology: Joel R Fried (Prentice- Hall of India)

Materials Chemistry (BESII-3P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Examination Scheme

Practical

P (U) : 25 Marks P (I) : 25 Marks

Duration of University Exam. : 03 Hrs

List of Experiments - Any Eight experiments should be performed out of the following:

1. Determination of acid Value of lubricating Oil
2. Determination of Viscosity of lubricating oil at different temp by Redwood Viscometer No. 1 or No.2
3. Adsorption of acetic acid on charcoal.
4. Determination of flash point of lubricating oil by Cleveland's apparatus open cup.
5. Determination of by flash point of lubricating oil Abel's apparatus closed cup
6. Determination of by flash point of lubricating oil Pensky Martins apparatus close cup
7. Determination of moisture content of coal.
8. Determination of volatile matter content of coal.
9. Determination of ash content of coal.
10. Saponification number of animal/vegetable oil.
11. Determination of molecular weight of a polymer by viscosity measurements.
12. Determination of carbon residue of lubricating oil by conradson's Apparatus.
13. consistency and Penetration test of grease
14. Saponification of acetic acid.
15. Determination of calorific values of a solid fuel using Bomb Calorimeter.
16. Preparation of Biodiesel and its characterization.

Laboratory Manual:

1. Applied Chemistry theory and practical O.P. Virmani and A.K.Narular (New Age International).
2. Laboratory Manual on Engineering Chemistry by Dr. Subdharani (Dhanpat Rai Publishing)

3. A Textbook on experiment and calculation in engineering chemistry by S.S. Dara S.Chand
4. Inorganic quantitative analysis, Vogel. (Prentice Hall).

Engineering Mechanics (BESII-4T)

(Total Credits: 03)

Teaching Scheme

Lectures: 2 Hours/ Week

Tutorial: 1 Hour / Week

Examination Scheme

Theory

T (U) : 40 Marks

T (I) : 10 Marks

Duration of University Exam. : 02 Hrs

Unit - I :

Important Vector Quantities:

(10 Hrs)

Position-vector, moment of a force about a point about an axis, couples, couple moment as a free vector.

Equivalent force systems:

Resultant of a 2 dimensional distributed loads and three-dimensional general force system Wrench.

UNIT - II :

Equations of Equilibrium:

(10 Hrs)

Free body diagrams, Equations of equilibrium coplanar concurrent and Non-concurrent systems, General spatial force system.

Analysis of simple pin jointed frames by method of joints method of sections.

Friction forces: Law of Coulomb friction, problems involving dry friction, simple applications like wedges and band brakes.

Unit - III :

(10 Hrs)

Centroids and Moments of Inertia:

Second Moment and products of inertia of plane areas, Moment of inertia of masses. Transfer theorems for moment of inertia and Product of inertia, Polar moment of inertia, Principal axes, Mohr's circle of inertia.

Introduction of Virtual work theorem:

Principle of Virtual work applied to equilibrium of Mechanisms, simple beam, Pin jointed frames.

Unit -IV:

(10 Hrs)

D'Alembert's Principle, work Energy method, (Expressions based on center of mass).

Methods of Momentum : Linear impulse momentum, considerations for a system of particles, Consideration of linear momentums, Elastic impact of two bodies, Direct central impact.

Books Recommended:

1. Engineering Mechanics: F.L Singer
2. Engineering Mechanics: Tmoshenko & Young
3. Engineering Mechanics: Bear and Johnson
4. Engineering Mechanics: I.H.Shames
5. Engineering Mechanics: R.D.Askhedkar & P.B.Kulkarni

Engineering Mechanics (BESII-4P)

(Total Credits: 01)

Teaching Scheme

Practical: 2 Hours / Week

Minimum 08 experiments based on the theory.

Examination Scheme

Practical

P (U) : 25 Marks

P (I) : 25 Marks

Duration of University Exam. : 03 Hrs

Advanced Electrical Engineering (BESII-5)

Total Credits: 03

Teaching Scheme

Lectures: 2 Hours/Week

Tutorial: 1 Hour/Week

Examination Scheme

Theory

T(U) : 40 Marks

Duration of University Paper

T (I) : 10 Marks

: 02Hrs

Unit – I : Introduction to Electrical Power System :

(8Hrs)

Introduction to Power Generation (Thermal, Hydro, Nuclear, Wind, and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels; Low voltage distribution system (Over head & Underground, single phase & three phase)

Necessity of equipment earthings, Fuses (Rewirable & HRC), MCB, ELCB (Elementary concepts only), Basic operation of UPS & Invertors (Block schematic representation).

Unit – II :DC Machines

(12Hrs)

Construction of a D.C Machine (without details of armature winding), Principle of working as a generator and as a motor, EMF equation of a DC machine, types of DC machines.

Concept of Back EMF, speed and torque equations, characteristics of motors, necessity of starters, Applications of DC motors.

Unit – III :Utilization of Electrical Energy Tariff

(8Hrs)

One part (KWH based) tariff with simple numerical: Students should be able to calculate the domestic electricity charges.

Illumination:

Definitions of luminous flux, luminous intensity, candle power, illumination, luminance, luminous efficiency (lumens/watt) of different types of lamps, working principle of Fluorescent/ Sodium Vapour/ Mercury vapour & CFL Lamps. Simple numerical to determine number of lamps to attain a given average lux level in an area.

Unit – IV :AC motor

(12Hrs)

Three-phase Induction Motors : Working principle, types & constructions of three phase Induction Motor, synchronous speed, torque, slip, torque -speed characteristic, application (No numerical).

Single Phase Induction Motor: Types of single phase Induction motors, operating principle and their applications.

Books Recommended:

- 1) Basic Electrical Engineering, S.N. Singh, PHI, Learning Private Limited.
- 2) A Text Book Of Electrical Technology, B. L. Tharaja and A. K. Tharaja, S. Chand Publication (Volume II & III)
- 3) Electrical Machines M. N. Bandyopadhyaya, PHI, Learning Private Limited.
- 4) Electrical Machines, Ashfaq Husain, Dhanpatrai Company, 4th edition.
- 5) Basic Electrical Engineering, D.C. Kulshreshtha, revised 1st edition, Tata Mc-Graw Hill education pvt. Ltd.
- 6) Generation of Electrical Energy- B. R. Gupta 4th Edition S Chand Publication
- 7) Testing Commissioning Operation & Maintenance Of Electrical Equipment – S. Rao Khanna Publication

Engineering Graphics – II (BESII-6)

Total Credits: 03

Teaching Scheme

Tutorial: 1 Hour/Week

Practical: 2 Hours/Week

Examination Scheme

Practical

P(I) : 25 Marks

P(U) : 25 Marks

Duration of University Exam : 03 Hrs

Introduction to CAD

(10 Hrs)

Advantages of using Computer Aided Drafting (CAD) packages, applications of CAD, basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

Sections of Solids

(08 Hrs)

Types of section planes, types of sectional views i. e. sectional FV , sectional TV, sectional SV, to project sectional views of above solids cut by different section planes (when solid is in simple position , when axis is parallel to one & inclined to other reference planes), to find true shape of sections.

Development of Lateral Surfaces (DLS) of Solids

(06 Hrs)

Applications of DLS, method of development, development of lateral surface of above solids, development of lateral surface of cut solids.

Interpretation of Given Views/Missing Views

(06 Hrs)

Identification of lines/edges and surfaces, visualization of given orthographic views, adding a missing/third view.

NOTE – ONLY FIRST ANGLE METHOD OF PROJECTIONS SHOULD BE USED

PRACTICAL:

Four A2 (594X420mm) (Half imperial) size drawing sheets & CAD work as detailed below:

Sheet No. 1 : Sections of Solids (Minimum 2 Problems)

Sheet No. 2 : Development of lateral surfaces of Solids (Minimum 3 Problems)

Sheet No. 3 : Section of solids using CAD package (Same problems as drawn in sheet no. 1)

Sheet No. 4 : Drawing Orthographic views using CAD package (Minimum 2 Problems)

Sheet No. 5 : Drawing Isometric views using CAD package.(Minimum 2 Problems)

Sheet No. 6 : Interpretation of Given Views/Missing Views. (Minimum 2 Problems)

Note: During external practical examination of 25 marks, students are expected to solve two problems on drawing sheet. (15 marks & duration : 1 Hr 30 Min). Oral of 10 marks should be conducted during external practical examination.

Books Recommended:

Text Books:

1. N.D. Bhatt, Elementary Engg. Drawing, Charotor Pub. House, Anand, India.
2. A. R. Bapat, “ Engineering Graphics”, Allied Publishers, New Delhi
3. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..
4. M.B. Shah, B.C. Rana, Engineering Drawing, Pearson.
5. CAD software user manual

Reference Books:

1. P.S. Gill, Engineering Graphics.
2. N.D. Bhatt, Machine Drawing, Charotor Publishing house, Anand, India.

WORKSHOP (BESII-7)

(Total Credits: 02)

Teaching Scheme

Practical: 2 Hours/Week

Examination Scheme

Practical

P (I): 25 Marks

P (U) :25 Marks

Duration of University Exam : 03 Hrs

Teachers/Instructors are expected to introduce the tools & equipments used in following shops with their operations & safety precautions.

1. Fitting - 1 Job
2. Carpentry - 1 Job
3. Welding - 1 Job
4. Smithy - 1 Job

Students are expected to prepare minimum four Jobs during practical periods of workshop.

Text/Reference Books:

Elements of Workshop Technology (Volume - 1): Hajra Choudhury

Ethical Sciences (BESII-8)

(Total Credits: 02)

Teaching Scheme

Theory: 2 Hours/Week

Examination Scheme

Theory

T (I): 50 Marks

Duration of Internal Examination: 02 Hrs

Unit – I :

- 1) Concept of Culture and Civilization.
- 2) Applied Humanities and Social Engineering.
- 3) Socio-Legal Awareness: Right to Information(RTI), Public Interest Litigation (PIL), Intellectual Property Rights(IPR) & Patents, Lokpal and Lokayukta .

Unit – II :

- 1) Meaning and Scope of Industrial Psychology and Industrial Sociology.
- 2) Fatigue, Selection and Training of Workers, Motives for Work in Industry.
- 3) Transactional Analysis.

Unit – III :

- 1) Sustainable development.
- 2) Professional Ethics.
- 3) Organizational Behavioral Dynamics: Leadership in Industry.

Unit – IV :

- 1) Indian Constitution and Federal System.
- 2) Fundamental Rights and Directive Principles.
- 3) Role of Bureaucracy in Modern Society.

Unit – V :

- 1) Industrial Democracy.
- 2) Works Organization: Power, Authority and Status System; Formal and Informal Organization.
- 3) Industrialization and Urbanization: Study of Slums.

Books Recommended:

- 1) A New Look into Social Science – Shabbir, Sheikh and Dwadashiwar
- 2) An Introduction to Sociology – Vaidya Bhushan and Sachadeva
- 3) Social Science: The Indian Scene – Yogesh Atal
- 4) Applied Humanities – rajni Tondon
- 5) A History of World Civilizations – J.E. Swain
- 6) Industrial Psychology – Haire Mason
- 7) Introduction to Constitution of India – Durga Das Basu
- 8) Industrial Sociology in India – N. R. Seth
- 9) Human Resource Development and Management – Dr. A. M. Sheikh
- 10) The Economics of Sustainable Development – Surender Kumar