1E3101

1E3101

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY2 – 01 Engineering Mathematics - I

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Find the limit of the sequence $<x_n>$, where $x_n = \dfrac{5n-3}{7n+8}$.

Q.2 Write the power series expansion of logarithm function.

Q.3 Evaluate a_n in the Fourier series of the function $f(x) = x + x^2$, $-\pi < x < \pi$.

Q.4 Define Cauchy's $(E - \delta)$ definition of continuity.

Q.5 Write Euler's theorem on homogeneous function.

Q.6 Evaluate: $\int_0^\infty x^6 e^{-2x} dx$ by using beta – gamma function.

Q.7 Evaluate: $\iint xy\, dx\, dy$, where the region of integration is $x + y < 1$ in the positive quadrant.

Q.8 Change the order of integration of the following double integration:

$$\int_0^4 \int_x^{2\sqrt{x}} f(x,y)\, dx\, dy$$

Q.9 If $\vec{f} = x^2 y\hat{i} - 2xy^2 z\hat{j} + 3x^2 z\hat{k}$, find div f at the point $(3, -1, -2)$.

Q.10 State Stokes theorem.

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Prove that –

$$B(m,n) = \frac{\overline{|m}\ \overline{|n}}{\overline{|(m+n)}}$$

Q.2 Test the convergence of the following series –

$$\frac{1}{2} + \frac{1.3}{2.4} + \frac{1.3.5}{2.4.6} + - - - - - - -$$

Q.3 Find a Fourier series for the function $f(x) = x^2$ in the interval $-\pi < x < \pi$ and deduce the following: $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots = \frac{\pi^2}{12}$

Q.4 Find the equations of the tangent plane and normal to the surface –

$x^3 + y^3 + 3xyz = 3$ at the point $(1, 2, -1)$.

Q.5 Evaluate the point where the function –

$x^3 y^2 (1 - x - y)$

Will have maxima. Also find the maximum value.

Q.6 Evaluate the integral –

$$\int_0^1 \int_0^x \frac{x^3 dx dy}{\sqrt{x^2 + y^2}}$$

by changing into polar coordinates.

Q.7 If $\vec{a}$ and $\vec{b}$ are differentiable vector point functions, then prove that –

$$\text{div}\left(\vec{a} + \vec{b}\right) = \vec{b}.\,\text{curl}\,\vec{a} - \vec{a}.\,\text{curl}\,\vec{b}$$

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Find the volume of spindle shaped solid generated by revolving the Astroid about the x – axis –

$$x^{2/3} + y^{2/3} = a^{2/3}$$

Q.2 If $u = \log x^3 + y^3 + z^3 - 3xyz$, then prove that –

$$\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$$

Q.3 Find half range cosine series for the function –

$$f(x) = 2x - 1, \, 0 < x < 1$$

hence deduce that –

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \text{-------}$$

Q.4 Find the volume of the tetrahedron bounded by the co – ordinate planes and the plane –

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$$

Q.5 State Gauss's divergence theorem. Verify Gauss's divergence theorem for $\vec{F} = xy \, \hat{i} + z^2 \hat{j} + 2yz\hat{k}$ on the tetrahedron $x = y = z = 0$ and $x + y \div z = 1$.

1E2401

1E2401

B. Tech. I - Sem. (Back) Exam., - 2023
BSC
1FY2 – 01 Engineering Mathematics - I

Time: 3 Hours

Maximum Marks: 160
Min. Passing Marks: 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____

2. NIL _____

PART – A

[10×3=30]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 The region bounded by the curves $y = x$, $x = 1$ and x-axis in the first quadrant of the xy-plane is rotate about the x-axis. The volume of the resulting solid of revolution is.

Q.2 Define convergence of a sequence.

Q.3 Define radius of convergence of a Power series.

Q.4 Write Euler's formula for a Fourier series.

Q.5 Show that function $f(x,y) = \dfrac{-x}{\sqrt{x^2+y^2}}$ has no limit at origin.

Q.6 Find the plane tangent to the surface $z = x\cos y - y\,e^x$ at $(0, 0)$.

Q.7 If $\vec{V} = x^2 z\,\hat{i} - 2y^3 z^2\,\hat{j} + x\,y^2\,\hat{k}$, then find $\operatorname{curl}\vec{V}$ at $(1, -1, 1)$.

Q.8 Find the maximum value of the directional derivative of the function $\phi = 2x^2 + 3y^2 + 5z^2$ at a point $(1, 1, -1)$.

Q.9 Whether the fluid motion given by $\vec{V} = (y+z)\hat{i} + (z+x)\hat{j} + (x+y)\hat{k}$ is incompressible or not?

Q.10 Evaluate $\iint_s \vec{r}\cdot\hat{n}\,dS$, where S is a closed surface and $\vec{r} = x\,\hat{i} + y\,\hat{i} + z\,\hat{k}$.

PART – B

[5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Using Gama and Beta integrals evaluate the following :

(a) $\displaystyle\int_0^\infty \frac{x^a}{a^x}\,dx$, (b) $\displaystyle\int_0^1 x^{3/2}\left(1-\sqrt{x}\right)^{1/2}dx$.

Q.2 Determine the surface of the solid of revolution of the ellipse $x^2 + 4y^2 = 16$ about its major axis.

Q.3 Test the convergence of the series:

$1 + \dfrac{\alpha+1}{\beta+1} + \dfrac{(\alpha+1)(2\alpha+1)}{(\beta+1)(2\beta+1)} + \dfrac{(\alpha+1)(2\alpha+1)(\alpha+1)}{(\beta+1)(2\beta+1)(3\beta+1)} +\ldots$

Q.4 Find the maxima and minima of the function -

$f(x,y) = x^3 + y^3 - 3x - 12y + 20$.

Q.5 If $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$, then evaluate $\operatorname{div}\left(\dfrac{\vec{r}}{r^3}\right)$.

Q.6 Change the Cartesian integrals into Polar integrals, evaluate the polar integrals.

$\displaystyle\int_1^2 \int_0^{\sqrt{2x-x^2}} \frac{1}{(x^2+y^2)^2}\,dy\,dx$.

Q.7 Show that $\vec{F} = (y^2\cos x + z^3)\,\hat{i} + (2y\sin x - 4)\hat{j} + (3x\,z^2 + 2)\hat{k}$ is conservative vector field and find a function ϕ such that $\vec{F} = \nabla\phi$.

PART – C

[4×20=80]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

Q.1 Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$. Use Parseval's identity to

prove that: $\quad \dfrac{\pi^4}{90} = 1 + \dfrac{1}{2^4} + \dfrac{1}{3^4} + \ldots$

Q.2 Show that function –

$$f(x,y) = \begin{cases} \dfrac{xy}{x^2+2y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$$

is not continuous at $(0, 0)$ but its partial derivatives f_x and f_y exist at $(0,0)$.

Q.3 Prove that volume of the greatest rectangular parallelopiped, that can be

inscribed in the ellipsoid $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$, is $\dfrac{8abc}{3\sqrt{3}}$.

Q.4 Find by double integration the area lying inside the circle $r = a \sin \theta$ and

outside the Cardioid $r = a(1 - \cos \theta)$.

Q.5 Verify Gauss's divergence theorem for the function

$\vec{F} = 2x^2\, y\, \hat{i} - y^2\, \hat{j} + 4x\, z^2\, \hat{k}$ taken over the region in the first octant

bounded by $y^2 + z^2 = 9$ and $x = 2$.

1E2201

1E2201

B. Tech. I - Sem. (Old Back) Exam., - 2023
MA – 101 Engineering Mathematics - I

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions, out of seven questions** including Question No. **1 which is Compulsory.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

Q.1   All questions are compulsory -   [8×2=16]

(a) Find asymptotes parallel to coordinates axes of $y^2 x - a^2 (x - a) = 0$

(b) Find the points of inflexion from curve $y = 3x^5 - 40x^3 + 3x - 20$

(c) What is the equation of equiangular spiral (Polar form) and direction of tangent is?

(d) If $u = e^{xyz}$, find $\dfrac{\partial^3 u}{\partial x\, \partial y\, \partial z}$

(e) Find equation of tangent plane to $z = \ln (2x + y)$ at $(-1, 3)$

(f) Change the order of integration $\iint e^{y^2}\, dxdy$

(g) Evaluate $\int x^2 (1-x)^3 dx$ by Beta function.

(h) If $f(x,y,z) = x^2 z\, i - 2y^2 z^2 j + xy^2 z k$ find curl f at $P(1,1,-1)$

Q.2 (a) Show that the asymptotes of the curve -

$$x^3 - 2y^3 + 2x^2y - xy^2 + y(x-y) + 1 = 0$$

Cut the curve in three points which lie on the line $x-y+1=0$ [8]

(b) Trace the curve $y^2(a+x) = x^2(a-x)$ [8]

Q.3 (a) Find the minimum value of $x^2 + y^2 + z^2$, when $x+y+z = 3b$ [8]

(b) If $u = \log(x^3+y^3+z^3-3xyz)$, prove - [8]

(i) $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = \dfrac{3}{x+y+z}$

(ii) $\left[\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} + \dfrac{\partial}{\partial z}\right]^2 u = \dfrac{-9}{(x+y+z)^2}$

Q.4 Show that the field defined by –

(a) $\vec{A} = (x^2+xy^2)i + (y^2 + x^2y)j$ is irrotational. Also find scalar potential. [8]

(b) If $F = (2x + y^2)i + (3y - 4x)j$, then evaluate $\int F.dr$ around a triangle ABC

in xy plane with A (0,0), B(2,0), C(2,1) in counter clock wise direction. [8]

Q.5 (a) Verify Green's theorem in plane for $\oint_c (x^2 + 2xy)dx + (y^2 + x^3y)dy$

where c is a square with vertices P(0,0), Q(1,0), R(1,1) and S(0,1). [8]

(b) Find the flux of the vector field A= $(x-2z)i + (x+3y+z)j + (5x+y)k$

through the upper side of triangle ABC with vertices at points A(1,0,0),

B(0,1,0) and C(0,0,1). [8]

Q.6   (a) Evaluate -   [8]

(i) $\int_0^\infty \frac{1}{1+x^4} dx$

(ii) $\int_0^{\frac{\pi}{6}} \cos^4 3\theta \sin^2 6\theta \, d\theta$

(b) Evaluate $\iint_R (x^2 + y^2) \, dxdy$, where R is the region bounded by y=x and

$y^2 =4x$ [8]

Q.7   (a) Find the surface and volume of the spindle shaped solid formed by

revolving the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$ about the x axis.   [8]

(b) If measurement of radius of base and height of a right circular cone are

incorrect by -1% and 2% respectively, then find the error in its volume.   [8]

1E2002

B. Tech. I - Sem. (Old Back) Exam., - 2023
102 (O) Engineering Mathematics - I

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

Instructions to Candidates:

Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL_____   2.   NIL_____

UNIT- I

Q.1   (a)   Find the asymptotes of the curve -   [8]

$$4x^3 - x^2y - 4xy^2 + y^3 + 3x^2 + 2xy - y^2 + x + 2y - 5 = 0$$

   (b)   Find the point of inflexion of the curve -   [8]

$$y = x^4 - 6x^3 + 12x^2 - 5x + 7$$

OR

Q.1   (a)   Find the equation of the circle of curvature of the parabola $y^2 = 12x$ at the point (3, 6).   [8]

   (b)   Trace the curve $r = a + b \cos \theta$, $a > b$ [8]

UNIT- II

Q.2
(a) If $u = \sin^{-1}\left(\dfrac{5x + 2y + 3z}{x^6 + y^6 + z^6}\right)$ find the value of - [8]

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$$

(b) Find the error in volume and total surface area of a right circular cone when its height is 4 cm and altitude is 6 cm when the errors in measurement of r and h be 1% in each.

[8]

OR

Q.2
(a) Examine $f(x, y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ for extreme value. [8]

(b) A wire of length l is cut into two parts which are bent in the form of a square and circle respectively. Find the least value of the sum of the areas so found.

[8]

UNIT- III

Q.3
(a) Find the length of the arc of the parabola $x^2 = 4ay$ cutoff by its latus rectum.

[8]

(b) Find the volume of the solid generated by revolution of the curve $y^2(a-x) = a^2x$ about its asymptote.

[8]

OR

Q.3
(a) Evaluate $\displaystyle\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2 + y^2}}\, dx\, dy$ by changing the order of integration. [8]

(b) Established the relation between Beta and Gamma function –

[8]

$$B(m, n) = \frac{\overline{\lceil m}\ \overline{\lceil n}}{\overline{\lceil m + n}}$$

UNIT- IV

Q.4 (a) Solve- $\dfrac{dy}{dx}+\dfrac{x^2+3y^3}{3x^2+y^2}=0$ [8]

(b) Solve- $(3xy + 2y^3)\,dx + (4x^2 + 6xy^2)\,dy = 0$ [8]

OR

Q.4 (a) Solve- $(D^2 - 4D + 4)\,y = 8\,x^2\,e^{2x}\sin 2x$ [8]

(b) Solve- $\dfrac{d^2y}{dx^2}+3\dfrac{dy}{dx}+2y\cos h\,x\sin x$ [8]

UNIT- V

Q.5 (a) Solve- $x^2\dfrac{d^2y}{dx^2}-x\dfrac{dy}{dx}-3y=x^2\log x$ [8]

(b) Solve- $\left(2x^2+3x\right)\dfrac{d^2y}{dx^2}+(6x+3)\dfrac{dy}{dx}+2y=(x+1)e^x$ [8]

OR

Q.5 (a) $\dfrac{d^2y}{dx^2}-\cot x\dfrac{dy}{dx}-(1-\cot x)y=e^x\sin x$ [8]

(b) Solve the following differential equation using method of variation of parameters - [8]

$$\dfrac{d^2y}{dx^2}-y=\dfrac{2}{1+e^x}$$

1E3102

1E3102

B. Tech. I - Sem. (Main / Back) Exam., - 2023

1FY2 – 02 Engineering Physics

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____

2. NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Excessively thin film appears dark why?

Q.2   What do you mean by resolving power of an optical instrument?

Q.3   What is normalized and orthogonal wave function?

Q.4   Explain total internal reflection.

Q.5   What are the relation between Einstein's Coefficients? Explain them.

Q.6   What is Hall effect?

Q.7   What is scalar and vector field?

Q.8 Define curl and divergence of a vector.

Q.9 What do you mean by spectral purity?

Q.10 What will be the effect on diameters in Newton's ring experiment if film is of μ refractive index?

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Two coherent sources of intensity ratio α interfere. Prove that in the interference pattern $\dfrac{I_{max} - I_{min}}{I_{max} + I_{min}} = \dfrac{2\sqrt{\alpha}}{1 + \alpha}$

Q.2 A single slit is illuminated by light composed of two wavelengths λ_1 and λ_2. One observes that due to diffraction, the first minima obtained for λ_1 coincides with the second diffraction minima of λ_2. What will be the relation between λ_1 and λ_2?

Q.3 A laser beam has a power of 50 mw. It was an aperture of 5×10^{-3}m and wavelength 7000 Å. A beam is focused with a tens of focal length 0.2 m. Calculate the area spread and intensity of the image.

Q.4 An optical fibre has a numerical aperture of 0.2 and cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has a refractive index of 1.33.

Q.5 An electric field of 100 V/M is applied to a sample of n-type semi conductor whose Hall coefficient is -0.0125m^2/ Coulomb. Determine the current density in the sample assuming mobility of electrons is 0.36m^2/V/S.

Q.6 Derive Laplace's and Poisson's equations starting from the differential form of Gauss's Law.

Q.7 Find the probability that a particle is in one dimensional box of length l can be found between 0.45 l and 0.55 l for the ground and first excited states.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Describe and explain the formation of Newton's rings in reflected monochromatic light. How can these be used to determine the wavelength of light? Derive the formula used. [6+4=10]

Q.2 (a) Derive the Schrodinger time dependent equation and explain the physical meaning of wave function ψ. [8]

(b) What do you mean by degeneracy? [2]

Q.3 (a) Discuss the formation of energy bands in solids. [5]

(b) Classify the solids on the basis of energy bands and discuss the conductivity in semiconductors. [3+2=5]

Q.4 Derive the formula for curl and divergence for electrostatic field and static magnetic field. [5+5=10]

Q.5 (a) What is an optical fibre? Obtain an expression for numerical aperture of step index optical fibre. [5]

(b) Explain visibility of fringes as a measure of coherence. [5]

1E2402

1E2402
B. Tech. I - Sem. (Main / Back) Exam., March - 2023
BSC
1FY2 – 02 Engineering Physics

Time: 3 Hours

Maximum Marks: 160
Min. Passing Marks: 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL_____   2. NIL_____

PART – A

[10×3=30]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is Rayleigh Criterion of resolution? How is resolution limit defined with the help of it?

Q.2   What is ground state energy of a quantum mechanical system? Why is it non-zero?

Q.3   State the physical significance of a quantum mechanical wave function.

Q.4   State normalization and orthogonality conditions for quantum mechanical wave functions.

Q.5 How would you define the visibility of an interference pattern? Define parameter of visibility.

Q.6 What is the function of He gas in laser action in He-Ne laser? Why is it taken in abundance?

Q.7 State the necessary conditions for laser action.

Q.8 Draw the position of donor level in n-type semiconductor and acceptor level in p–type semiconductor.

Q.9 Why was the correction needed in Ampere's Law to obtain Maxwell's fourth equation?

Q.10 State the physical significance of Poynting theorem.

PART – B   [5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 The convex surface of a Plano-convex lens is resting on a glass plate to produce Newton's rings with the help of a monochromatic light source. The position of 7th bright ring is observed from the eye lens of a travelling microscope. When the Plano-convex lens is raised by a distance 2.2μm from the glass plate, the 15th bright ring seems to occupy the position of previous 7th bright ring. Evaluation the wavelength of light used.

Q.2 A plane transmission grating of 15000 lines per inch is producing diffraction of light from a polychromatic light source. Find the angle of separation of the 5048Å and 5016Å lines of He in second order spectrum.

Q.3 What would be the probability for an electron to be found in one-dimensional potential box of width 'a' between x = 0 and x = a/n; when it is in its 'nth' state.

Q.4 A step index optical fibre has a core radius of 30μm; refractive index of core=1.5 and refractive index of cladding = 1.47. If the operating wavelength is 800nm, find the number of modes propagating through the fibre.

Q.5 For making a laser source of wavelength λ=5000Å, what would be the required temperature to achieve equal rates of spontaneous and stimulated emission?

Q.6 A current of 1A is flowing along the length of a copper bar of length 10mm, width 1mm and thickness 0.1mm. A magnetic field of 1T is applied normal to the width and length of the bar. Calculate the Hall field and Hall voltage if the Hall coefficient for copper is $- 0.55 \times 10^{-10}$ m^3/c.

Q.7 Calculate the conduction and displacement current densities in a material of conductivity 10^{-4}s/m and $\in_r$ = 3.5. If the electric field in the material is $5 \times 10^{-6} \sin (9 \times 10^9 t)$ v/m.

PART – C   [4×20=80]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

Q.1 (a) Develop the expression for radius of circular interference fringes obtained in Michelson's interferometer with the help of a suitable diagram.

(b) Starting from the expression of intensity from diffraction of light from N-slits, construct the resulting intensity pattern by showing the contribution of interference and diffraction component of expression. Use proper mathematical treatment needed for construction of this pattern.

Q.2 (a) Develop the expression of the Schrodinger's time independent wave equation for a free particle confined in a rigid cube of side 'L'.

(b) Define the term – Degeneracy of quantum states.

(c) State the degree of degeneracy of all possible quantum mechanical state up to $n_x^2 + n_y^2 + n_z^2 = 17$.

Q.3 (a) Explain the lasing action in He-Ne laser with the help of an energy level diagram.

(b) Develop the relationship between Einstein's coefficients.

Q.4 (a) Write all Maxwell's equations in both integral and differential form.

(b) Write the statement of Poynting theorem.

(c) Derive the expression of Poynting theorem.

Q.5 Prove that in high frequency region laser action is not possible.

1E2204

1E2204

B. Tech. I - Sem. (Old Back) Exam., - 2023
PY – 101 Engineering Physics

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

    *Attempt any **five questions, out of seven questions** including Question No. **1 which is Compulsory**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

    Units of quantities used/calculated must be stated clearly.

    Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

Q.1   Compulsory, Answer for each sub-question be given in about 25 words -   [8×2=16]

    (a) How do circular fringes originate in Michelson's interferometer?

    (b) What are antireflection films?

    (c) What are the essential conditions for diffraction?

    (d) What do you understand by 'resolution?

    (e) What is optical activity?

    (f) State Malus Law.

    (g) What is Fermi energy?

    (h) Explain Coherence length and Coherence time.

Q.2 (a) Consider an anti-reflecting film of refractive index 1.38. Assume that its thickness is 9×10^{-6} cm. calculate the wavelength in the visible region for which the film will be anti-reflecting? [8]

(b) Calculate the distance between two successive positions of a movable mirror of a Michelson interferometer giving distinct fringes in case of sodium light having lines of wavelengths 5890 A° and 5896 A°. [8]

Q.3 (a) What will be the diameter of a telescope objective which is required to resolve two stars separated by an angle of 10^{-3} degree? Assume $\lambda = 5000$ A°. [8]

(b) With necessary theory, explain the formation of spectrum by a plane transmission grating when composite light falls on it. [8]

Q.4 (a) Explain Hall Effect and Hall Coefficient. [8]

(b) Derive Bragg's equation for reflection of X-rays by crystal planes. [8]

Q.5 (a) Show that the Fermi level lies at the centre of the energy gap in an intrinsic semiconductor. [8]

(b) Write Schrodinger's time dependent and time independent equation. [8]

Q.6 (a) Prove that in high frequency region laser action is not possible. [8]

(b) Draw neat labelled diagram of He-Ne gas laser and explain its working. [8]

Q.7 (a) What is optical fibre? Describe the construction and working of the optical fibre. [8]

(b) Show that visibility is a measure of Coherence. [8]

1E2003

1E2003

1E2003

B. Tech. I - Sem. (Old Back) Exam., - 2023
103 (O) Engineering Physics - I

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____

2. NIL _____

UNIT- I

Q.1 Explain the working of Michelson interferometer. How circular fringes be produced with it? Show with necessary theory how it is used to measure the difference in the wavelength between D lines of sodium light. [4+4+8=16]

OR

Q.1 Find the minimum thickness of a layer of magnesium fluoride ($\mu = 1.38$) required in an interference filter designed to isolate light of wavelength 5893 Å. How will peak transmittance change if the filter is tilted by 10°? [16]

UNIT- II

Q.2 Define specific rotation. Describe the construction and principal of half shade and Bi-quartz device. [4+6+6=16]

OR

Q.2   A thin sheet of cellophane acts as a half wave plate for light of wavelength 5000 Å. Find the wave lengths in visible region for which sheet could act as a quarter wave plate. Find the least thickness of this sheet also. ($\mu_E = 1.554$, $\mu_0 = 1.544$)   [16]

UNIT- III

Q.3   A plane transmission grating produces an angular separation of 0.01 radian between two wavelengths observed at an angle of 30°. If the Mean value of the wavelength is 5000 Å and the spectrum is observed in the second order, calculate the difference in the two wavelengths.   [16]

OR

Q.3   (a) A diffraction grating just resolves line 4547.27 Å and 4547.98 Å in third order. Will it resolve lines 6437.48 Å and 6437.95 Å in the first order?   [8]

(b) Deduce an expression for the resolving power of a grating.   [8]

UNIT- IV

Q.4   The hall voltage for the sodium metal is 0.001 mV, measured at I = 100 mA, B = 2 Tesla, the width of the specimen = 0.05 mm and $\sigma = 2.09 \times 10^7 \Omega^{-1} m^{-1}$, (a) calculate the number of carriers per cubic meter in sodium and (b) calculate the mobility of electrons in sodium.   [16]

OR

Q.4   (a) Explain on the basis of Bragg's law, the diffraction of X-rays produced by crystals.   [8]

(b) Explain the formation of energy bands in solids. Also explain how it helps to classify the materials into conductors, insulators and semiconductors.   [8]

UNIT- V

Q.5   Derive an expression for the variation of mass with velocity.   [16]

OR

Q.5   State the postulates of special theory of relativity and deduce Lorentz transformations.   `[4+12=16]

1E3103

1E3103

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY2 – 03 Engineering Chemistry

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL_____   2. NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)
All questions are compulsory

Q.1   What is carbonate hardness?

Q.2   What is phosphate conditioning?

Q.3   Properties and uses liquid fuel.

Q.4   Define cetane number.

Q.5   Cathodic protection of metal.

Q.6   Give proportion basic constitution of cement.

Q.7   Importance of lubrication in machines.

Q.8 Properties and uses of hard glass.

Q.9 Discuss elimination reaction with example.

Q.10 Why fire point is higher than flash point?

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Analysis report of water is as per the following –

$Mg (HCO_3)_2 = 73mg/litre$; $MgSO_4 = 60mg/Litre$

$CaCl_2 = 111mg/litre$; $CaCO_3 = 50mg/Litre$

$HCO_3 = 122mg/litre$; $H_2CO_3 = 100mg/Litre$

Calculate the requirement Lime and Soda for softening 1,00,000 Litres of water.

Q.2 Calculate the gross and net calorific values of coal sample with following composition -
$C = 85\%$; $H = 5\%$; $O = 2\%$; $S = 1\%$; $N = 2\%$; $Ash = 5\%$

Q.3 Explain galvanic corrosion with proper example.

Q.4 Discuss the importance of Lime saturation factor and Silica Modulus in cement manufacturing.

Q.5 Discuss the cloud point and pour point of lubricating oil with its importance.

Q.6 Explain break point chlorination method of sterilization.

Q.7 Describe the mechanism of free radical halogenation of alkenes.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 What is water softening? Describe water softening by zeolite method with labelled diagram. [10]

Q.2 Define coke. Explain Otto-Hoffmann by Product Oven Method for making coke. [10]

Q.3 (a) Explain the mechanism of electrochemical net corrosion with example. [7]

(b) What is pilling - bedwroth rule. [3]

Q.4 (a) Explain the property of setting and hardening of cement. [7]

(b) Role of gypsum addition in cement. [3]

Q.5 (a) Explain the manufacturing, properties and uses of Paracetamol. [7]

(b) Importance of drugs in daily life. [3]

1E2403

B. Tech. I - Sem. (Back) Exam., - 2023
BSC
1FY2 – 03 Engineering Chemistry

Time: 3 Hours

Maximum Marks: 160
Min. Passing Marks: 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____   2.   NIL _____

PART – A   [10×3=30]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is the hardness of water? Write the name of temporary hardness causing ions.

Q.2   What is the difference between priming and foaming?

Q.3   Discuss the role of gypsum in cement.

Q.4 What is Dulong's formula for calculating calorific value?

Q.5 What is the degree of hardness?

Q.6 Write the name of disinfectants.

Q.7 What is Net and Gross calorific value?

Q.8 Describe cetane no. of fuel.

Q.9 Explain the annealing process of glass.

Q.10 What is difference between substitution and elimination reactions?

PART – B   [5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Explain the purification process of municipal water.

Q.2 Explain the process of carbonization with the help of flow chart.

Q.3 Determine the calorific value by Junker's method.

Q.4 Explain concentration and pitting corrosion.

Q.5 What is synthetic petrol? Explain Fischer Tropsch process of making

synthetic petrol.

Q.6 Explain the synthesis and properties of paracetamol.

Q.7 Write note on dehydration of Alcohols.

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

Q.1 (a) What is difference between temporary and permanent hardness? Determine the hardness of water by complexometric method.

(b) 5 gm. $CaCO_3$ dissolved in dil HCl and make it up to 1 lt to prepare SHW. 20 ml of this SHW consumed 18 ml of EDTA on titration using EBT as an indicator. Similarly 20 ml of hard water and boiled water each consumed 15 ml and 12 ml of EDTA respectively. Calculate temporary, permanent and total hardness of water.

Q.2 Write the notes on following –

(a) Proximate analysis of coal

(b) Orsat apparatus

(c) Octane No.

(d) Knocking properties

Q.3 What is corrosion? Explain the mechanism of electrochemical corrosion. Discuss cathodic protection methods of minimize corrosion.

Q.4 What is Portland cement? Describe the manufacturing of cement by Rotatory Kiln technology.

Q.5 What is substitution reaction? Explain SN^1 and SN^2 reaction mechanism and discuss factors affecting the SN^2 reaction.

1E3105

1E3105

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY1 – 05 Human Values

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What do you mean by moral values?

Q.2   What is the difference between wealth and prosperity?

Q.3   How should state of happiness be defined?

Q.4   What does Sanyam and Swasthya mean?

Q.5   What is the comprehensive human goal?

Q.6   What do you mean by the term harmony?

Q.7   What is the meaning of natural acceptance?

Q.8   What does justice mean?

Q.9   What do the abbreviations SVDD, SSDD and SSSS signify?

Q.10   Why do we need to know ourselves?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   Differentiate between animal consciousness and human consciousness.

Q.2   What are the problems that we face today due to preconditioned desires, thoughts and selections?

Q.3   Distinguish between needs of self and needs of body.

Q.4   Explain the feelings of care, guidance, glory and gratitude.

Q.5   Discuss the five dimensions of human endeavour in the society.

Q.6   Discuss the need for value education in technical institutes.

Q.7   How does the feeling Sanyam facilitate the correct appraisal of our physical needs. Discuss.

PART – C   [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   The four orders in nature are interconnected and mutually fulfilling. Discuss.

Q.2   Discuss the broad holistic criteria for evaluation of technologies, production systems and management models.

Q.3   Explain self-exploration as the process of value education.

Q.4   Discuss the co-existence of units in space.

Q.5   Activities of imaging, analyzing and selecting/testing are constantly taking place in I. Discuss.

1E2405

1E2405

B. Tech. I - Sem. (Back) Exam., - 2023
HSMC
1FY1 – 05 Human Values

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____

2.   NIL _____

PART – A

[5×2=10]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is 'Self Exploration'?

Q.2   What do you understand by 'Sanyam'?

Q.3   What is the meaning of 'intention'?

Q.4   What is 'Harmony'?

Q.5   What is 'Humanistic Universal Order'?

PART – B

[4×10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1   What do you understand by 'happiness' and 'prosperity'?

Q.2   What are the needs of 'self' and 'body'?

Q.3   What do you understand by 'Samadhan', 'Samridhi', 'Abhay' and 'Sah-Astitva'?

Q.4   Discuss the importance of values in human-human relationship.

Q.5   Discuss the inter-connectedness among the four orders of nature.

Q.6   Discuss 'Definitiveness of Ethical Human Conduct'.

PART – C

[2×15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any two questions

Q.1   Discuss in detail universal order from family to word family.

Q.2   Discuss in detail 'Holistic perception of harmony at all levels of existence'.

Q.3   Discuss in detail 'understanding happiness and prosperity correctly – A critical appraisal of the current scenario.'

1E2203

B. Tech. I - Sem. (Old Back) Exam., - 2023

HU– 103 Human Values

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions, out of seven questions** including Question No.*
***1 which is Compulsory.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

Q.1 All questions are compulsory - [8×2=16]

(a) What are the four orders in nature?

(b) What do you mean by moral values?

(c) Define the term justice.

(d) How are a person be happy?

(e) How is wealth different from prosperity?

(f) What does holistic technology mean?

(g) What do you mean by innateness?

(h) How is animal consciousness different from human consciousness?

Q.2 Discuss the concept of Sanyam and Swasthya. [16]

Q.3 Family is the basic unit of interaction. Explain. [16]

Q.4 Explain fully the meaning and concept of self-exploration. [16]

Q.5 Discuss the broad holistic criteria for evaluation of technologies production systems and management models. [16]

Q.6 Explain the need for value education in technical institutes. [16]

Q.7 Critically examine the needs and activities of self and body. [16]

1E3104

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY1 – 04 Communication Skills

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL_____   2. NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is 'decoding'?

Q.2   What is 'communication barrier'?

Q.3   The following sentence is incorrect. Write the correct sentence:

English is speaking everywhere.

Q.4   Complete the following sentence using the correct tense. Hint is given to complete the sentence:

If you had played well...(win the match)

Q.5 What is a 'complaint letter'?

Q.6 What is 'paragraph'?

Q.7 Why was the author apprehensive at taking his lady friend to Foyot's?

Q.8 What happened to Pahom at the end?

Q.9 What is the central theme of the poem 'No Men are foreign'?

Q.10 What is 'Heaven of freedom'?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 What is the difference between verbal and non-verbal communication?

Q.2 What are the qualities of good communication?

Q.3 Insert appropriate modal verbs. Meaning is given in brackets.

    (i)   We...fight for our rights. (compulsion)

    (ii)   He...stop smoking. (advice)

    (iii) They...come any time. (possibility)

    (iv) She...oppose her husband. (Lack of courage)

Q.4 What is 'resume'? How is it written?

Q.5 Why does the author think that the divine justice has been delivered to him?

Q.6 Why should we not wage wars against each other?

Q.7 What is the theme of the poem 'If' by Rudyard Kipling?

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 What is 'downward communication'? Discuss its advantages and disadvantages.

Q.2 (a) Convert these sentences into Indirect speech:

    (i) The doctor said to him, 'you do not take rest'.

    (ii) She said to her husband, "I am watching TV.'

    (iii) The boys said to the girls, 'we will go to library'.

    (iv) My friend said, 'I don't eat rice'.

    (v) Anita said to her brother, 'I have finished my work.'

  (b) Choose the correct alternative:

    (i) He will go neither to the water park...............to the zoo. (nor/or)

    (ii) I had hardly reached the station..........the train left. (than/when)

    (iii) No sooner did he receive the phone call...............he left for his son's school. (when/than)

    (iv) He has neither a pencil................................a sharpener. (or/nor)

    (v) Both she............................her mother will prepare dinner. (and/either/as soon as)

Q.3 What is a paragraph? What things should be kept in mind while writing a paragraph?

Q.4 Describe how greed ruins Pahom.

Q.5 How does the poet suggest that all people on earth are the same?

1E2404

1E2404

B. Tech. I - Sem. (Back) Exam., - 2023
HSMC
1FY1 – 04 Communication Skills

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A   [5×2=10]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Mention the theme of the poem 'How much Land does a Man Need?'

Q.2   What do you know about 'Divisions of Human Communication'?

Q.3   What is the meaning of media?

Q.4   Mention two uses of the Modal Verb -'Need'.

Q.5   What do the expressions 'mind is without free' and 'head is held high' mean?

PART – B

[4×10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1   What are the main points that should be kept in mind while drafting an effective 'Business Letter'?

Q.2   Explain the central idea of the poem 'IF', highlighting the suggestions given by the poet Rudyard Kipling to his son.

Q.3   Differentiate between the different types of Conditional Sentences, giving two suitable examples of each. Discuss how they are used.

Q.4   Discuss the definition, types and components / parts of a report. How does it differ from an essay?

Q.5   Write short note on 'Formal and Informal Channels of Communication' with special emphasis on Corporate Communication.

Q.6   Outline the key happenings and events in the short story 'The Luncheon' by Somerset Maugham.

PART – C

[2×15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any two questions

Q.1   Describe the Cycle of Communication with the help of a diagram. Discuss the qualities of good communication in detail.

Q.2   Your College urgently requires a teacher to teach Universal Human Values for which they have placed an advertisement in The Bhilai Express. You are Sanjay/Sanjana Sharma from 21, Vasantmarg, Bhilai. Draft a letter including a CV, applying for the advertised post (120 – 150 words.)

Q.3   Portray the character sketch of the author / narrator in the Short Story "The Night Train at Deoli" by Ruskin Bond.

1E3106

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY3 – 06 Programming for Problem Solving

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL_____   2. NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Explain single and multiline comments in C.

Q.2   Describe any four preprocessor directives in C.

Q.3   Describe various symbols used in flow chart.

Q.4   Why keywords cannot be used as identifiers in C?

Q.5   Write the importance of using functions in C.

Q.6   Write pseudo code for checking whether the entered number is even or odd.

Q.7   Differentiate break and continue statements with example.

Q.8   Describe various modes of opening a file in C.

Q.9   How does do-while statement differ from while statement?

Q.10   Explain relational operators with example.

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   Find r's complement of following numbers where r is radix(base) of these

       numbers –

       (i) $(CAFE27)_{16}$

       (ii) $(246700)_{10}$

       (iii) $(1101100)_2$

       (iv) $(320)_8$

Q.2   Write a C program to swap two numbers without using third variable.

Q.3   Give differences between primary and secondary memory in tabular form.

Q.4   Convert the following -

       (i) $(1998)_{10}$ = $(?)_2$

       (ii) $(11011)_2$ = $(?)_{10}$

       (iii) $(921)_{10}$ = $(?)_8$

       (iv) $(654)_8$ = $(?)_{10}$

Q.5   Explain Von Neumann architecture in detail.

Q.6   Write a C program to find smallest element in an array.

Q.7   Explain the importance of pointers with respect to dynamic memory

       allocation.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   Write a C program to count number of characters in a text file using file handling.

Q.2   Write a C program to print patterns -

```
1    2    3    4    5
6    7    8    9
10   11   12
13   14
15
```

Use for / while loop.

Q.3   How does recursion work? Explain with the help of example. Write advantages and disadvantages of using recursion.

Q.4   Explain call by value and call by reference with help of example of each.

Q.5   Write a C program which store information of 10 students in a structure using loop. For each student, structure maintain roll no., name of student, admission year, category.

After storing the information, also display the information for all students.

1E2406

1E2406

B. Tech. I - Sem. (Back) Exam., - 2023
ESC
1FY3 – 06 Programming for Problem Solving

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____   2.   NIL _____

PART – A   [5×2=10]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What are the difference between primary and secondary memory?

Q.2   What is an operator overloading?

Q.3   Define switch-case statement.

Q.4   What do you mean by pseudo code?

Q.5   What is MSB & LSB?

PART – B

[4×10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1 Explain the input & output devices in detail?

Q.2 Explain the concept of file handling in detail?

Q.3 What is an algorithm? Write a algorithm to find prime number?

Q.4 Explain Von-neumann architecture with block diagram?

Q.5 Salve the following -

(i) $(0.874)_8 = (?)_{10}$

(ii) $(1SSA. 3D)_{16} - (?)_8$

(iii) $(11101101.10101)_2 = (?)_{16}$

Q.6 Write a program to find n^{th} largest and n^{th} smallest number in an array?

PART – C

[2×15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any two questions

Q.1 Write a program in C to read 15 numbers from keyboard and find their sum and average using loops.

Q.2 What do you mean parameter passing in C? Also write a 'C' program to find Fibonacci series.

Q.3 Write an algorithm and C program to print the following pattern -

```
A
B   B
C   C   C
D   D   D   D
E   E   E   E   E
F   F   F   F   F   F
```

1E3107

B. Tech. I - Sem. (Main / Back) Exam., - 2023

1FY3 – 07 Basic Mechanical Engineering

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>NIL</u>   2. <u>NIL</u>

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Describe Law of Thermodynamics?

Q.2 Describe with figure different type of belt drive.

Q.3 Define the coefficient of performance of Refrigerator.

Q.4 What is the pattern in casting process?

Q.5 What is industrial engineering & its scope?

Q.6 Differentiate between water tube and fire tube boiler?

Q.7 Write a short note on different type of power plants.

49

Q.8   What is the IP & BP in the Internal Combustion Engine?

Q.9   Describe modern tools used in Mechanical Engineering.

Q.10   Differentiate between impulse and reaction turbine?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   Explain any one type of water tube boiler with neat sketch.

Q.2   Explain differentiate between 2 stroke & 4 stroke engine.

Q.3   How Cavitation can be eliminated by Pump?

Q.4   Describe with figure different types of belt drive?

Q.5   What is air conditioning? Draw and describe different component used in it.

Q.6   Explain the various stages of Heat treatment process?

Q.7   Write short notes on –

(i) Forging

(ii) Drawing

PART – C   [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   What is meant by refrigeration system? Describe vapor compression refrigeration system?

Q.2   What is gear transmission? Describe different types of gear.

Q.3   Describe rolling process with neat sketches.

Q.4   With a suitable sketch explain the working of centrifugal pump.

Q.5   Describe hardening and tempering of steel.

1E2407

1E2407

B. Tech. I - Sem. (Back) Exam., - 2023

ESC

1FY3 – 07 Basic Mechanical Engineering

Time: 2 Hours   **Maximum Marks: 80**
                                                     Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____   2.   NIL _____

PART – A   [5×2=10]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What do you mean by Steam Boilers? Classify of Steam Boilers.

Q.2   Write a short note on main components of I. C. Engines.

Q.3   Describe Law of Thermodynamics.

Q.4   What is patterns? Name different types of patterns.

Q.5   Define the coefficient of performance of Refrigerator.

PART – B

[4×10=40]

(Analytical/Problem solving questions)
Attempt any four questions

Q.1 Describe the four stroke petrol Engine with suitable diagram.

Q.2 Explain the various stages of heat treatment process.

Q.3 What do you mean by refrigeration system? Describe vapors compression refrigeration system.

Q.4 Define Transmission of power. Describe different types of gears.

Q.5 What is metal casting? Describe metal casting process with suitable diagram.

Q.6 Define boiler Mounting and boiler accessories. Explain blow down value with suitable diagram.

PART – C

[2×15=30]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any two questions

Q.1 What is hydroelectric power plant? Explain working operation with suitable diagram and also advantages and disadvantages of Hydroelectric power plant.

Q.2 What is pump? Describe working and applications of reciprocating pump and difference between reciprocating and centrifugal pump.

Q.3 Describe the following terms -
   (i) Case hardening
   (ii) Nitriding
   (iii) Extrusion
   (iv) Rolling
   (v) Drawing

1E3108

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY3 – 08 Basic Electrical Engineering

Time: 3 Hours　　　　　　　　　　　　　　　**Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____　　　　2. NIL _____

PART – A　　　　　　　　　　　　　　[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1　Explain the phasor representation of power.

Q.2　State Kirchoff's voltage law.

Q.3　What is fuse?

Q.4　State the torque-slip characteristics of induction motor.

Q.5　Discuss the transformer EMF equation.

Q.6　What are the transformer losses?

Q.7   What is BJT?

Q.8   Explain working principle of induction motor.

Q.9   Explain MCB.

Q.10   What is resonance?

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   State maximum power transfer theorem.

Q.2   For the circuit shown in Fig. find VCE and VAG
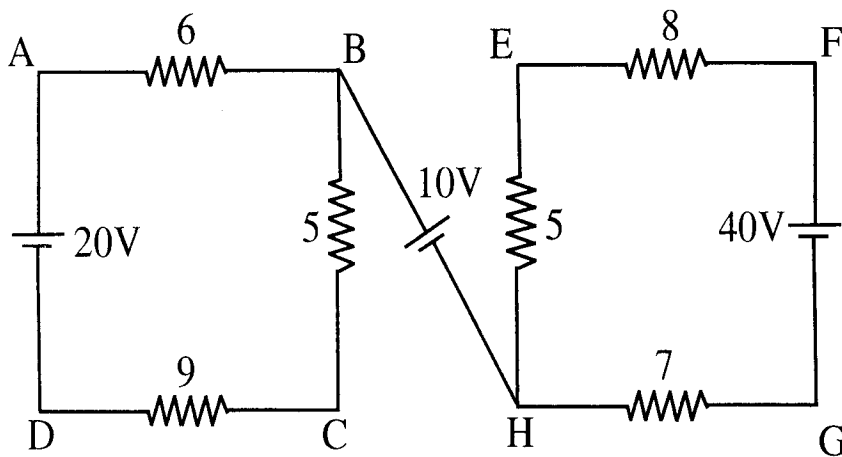
Q.3   An alternating voltage is given by V=230sin 314t. Calculate frequency and

       maximum average & RMS value of voltage.

Q.4   Describe the construction details of single phase transformer.

Q.5   With a neat circuit diagram, explain the construction and principle of

       operation of DC machine.

Q.6   Explain IGBT in detail with neat diagrams.

Q.7   With suitable example, explain the calculations for energy consumption.

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   Use Superposition Theorem to find the current in 40 ohm, in the network

shown:
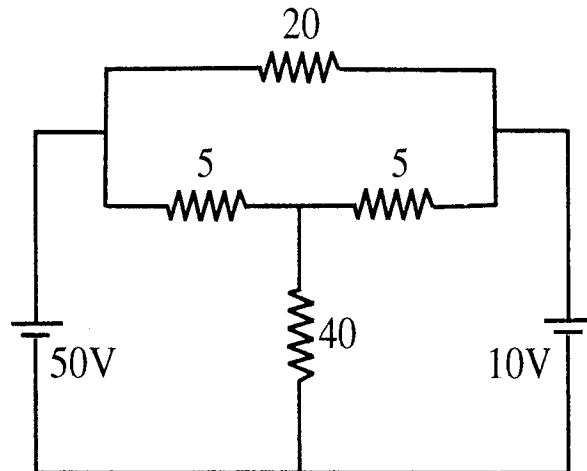
Q.2   Explain about Star and Delta connected three phase balanced circuits.

Q.3   Explain the tests on a single phase transformer and develop an equivalent

from the above tests.

Q.4   Explain the different characteristics of DC Motor.

Q.5   Explain different types of Earthing with suitable diagram.

1E2408

1E2408

B. Tech. I - Sem. (Back) Exam., - 2023

ESC

1FY3 – 08 Basic Electrical Engineering

Time: 2 Hours   Maximum Marks: 80
                                                               Min. Passing Marks: 28

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL_____   2.   NIL_____

<div align="center">

PART – A   [10×1=10]

<u>(Answer should be given up to 25 words only)</u>
<u>All questions are compulsory</u>

</div>

Q.1   Find the frequency at which the impedance magnitude of 5 mH inductor and 20 Micro Farad capacitance are same.

Q.2   Find the RMS value of a current given by $i(t) = 5 + 20\sin 10^6 t$.

Q.3   Write the relation between line & phase current in a balanced 3–ϕ star network.

Q.4 Write the name of different losses in a transformer.

Q.5 Draw the VI characteristics of a reverse biased PN diode.

Q.6 Write one difference between a MCB and MCCB.

Q.7 Convent a voltage source 20∠30°, source resistance 100Ω to equivalent current source.

Q.8 Define the transformer regulation & its efficiency.

Q.9 Draw the phase diagram of a RC and RL network.

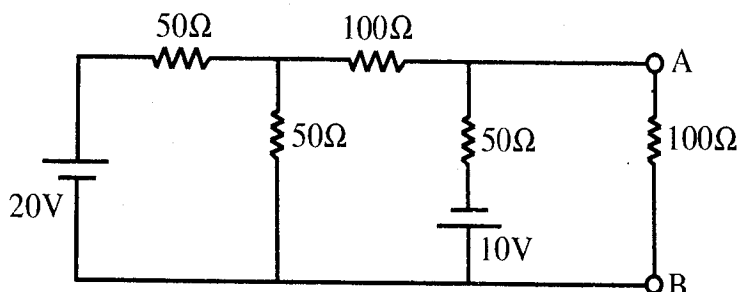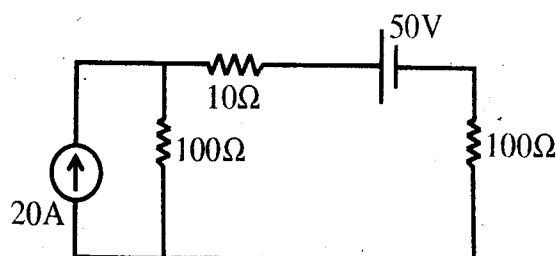Q.10 Write the ideal conditions of a voltage & current source.

PART – B   [4×10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1 Find the Norton source at terminal AB in the following network.

Q.2 Draw the torque speed characteristic of DC motor & explain its working.

Q.3 Find the current in 10Ω resistor using Nodal equation.

Q.4 Draw the impedance variation of a parallel resonance circuit with frequency and show its bandwidth.

Q.5 Find the base & collector current in following BJT (Si) transistor. Assume $\beta = 80$.
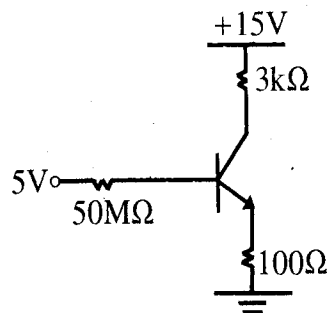

Q.6 Draw the structure of SCR and explain its working.

PART – C

[2×15=30]

### (Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any two questions

Q.1 (a) Develop the EMF equation of a transformer and draw its electrical equivalent circuit when all load transferred to primary side.

(b) Calculate the equivalent load in secondary side in a 3:1 transformer. When a resistor of 500Ω connected in primary side.

Q.2 Find the Thevenin's voltage & resistance at AB terminal in following network.
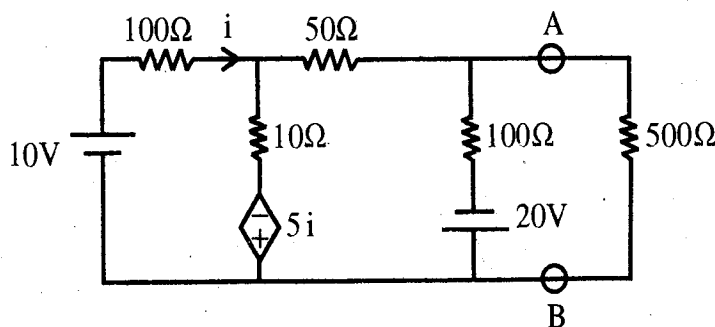
Q.3 If $V_{ab} = 240V\angle15°$ in following network -
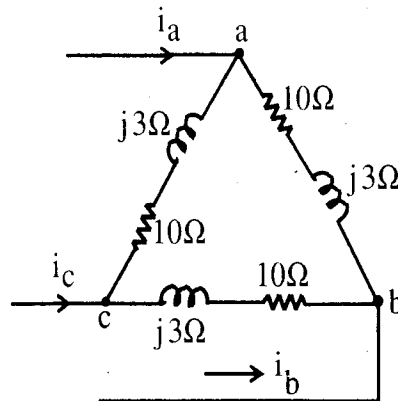
then determine phase currents, line currents and draw the phasor diagrams.

1E3109

1E3109

B. Tech. I - Sem. (Main / Back) Exam., - 2023

1FY3 – 09 Basic Civil Engineering

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1.   NIL _____   2.   NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is Surveying?

Q.2   Define Building Byelaws.

Q.3   Discuss the difference between Plinth area and Carpet area.

Q.4   Enlist any four traffic signs.

Q.5   Differentiate Foresight, Back sight and Intermediate sight.

Q.6   What do you understand by 'Infrastructure' Development?

Q.7   What is the Flow of energy in the ecosystem?

Q.8   Write the name of two instrument used in linear measurements.

Q.9   Define latitude and longitude of a line.

Q.10   What do you mean by ecosystem?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   What are the fundamental principals of surveying? Explain briefly.

Q.2   Explain "how Orientation affects the ventilation of a building".

Q.3   Enlist any four important chemical characteristics of raw water. Mention the method of analysis and its acceptance value as per water Quality standards of any two of them.

Q.4   Calculate plinth area, floor area and carpet area for the plan of a building given below. Wall thickness is 30 cm.
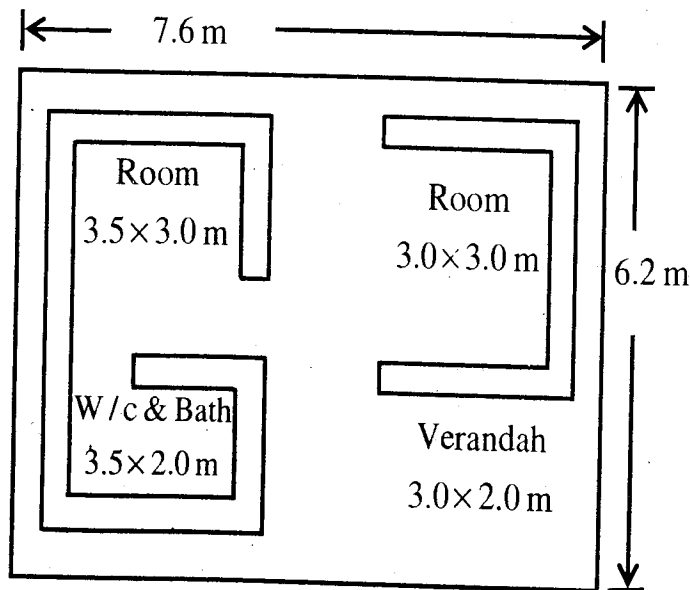
Q.5   Write short note on "Energy recovery from recycling of solid waste".

Q.6   Explain the methods to control noise pollution.

Q.7   Write short note on "Transportation Engineering".

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any three questions

Q.1 Explain the steps involved in laying out of building plan on ground.

Q.2 Explain with a neat sketch constriction of a Prismatic compass.

Q.3 Discuss the components of a residential building with a neat figure.

Q.4 Discuss with neat sketch –

(1) Hydrological cycle

(2) Carbon cycle

Q.5 In traversing in anti-clock wise direction, the following readings were observed.

Line	AB	BC	CD	DE	EA
Fore Bearing	105°15'	20°00'	316°30'	187°15'	122°45'

Draw a neat sketch of the traverse. Determine the interior angles of the traverse and apply check.