Serial No. 10347

BEE-101

Roll No.

B. Tech.
FIRST SEMESTER
MAJOR EXAMINATION 2022 - 2023
Fundamentals of Electrical Engineering

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carry equal marks.

1.   **Attempt any five parts of the following:** $(5 \times 2 = 10)$

    (a)   Explain the difference between a circuit and a network.

    (b)   State & explain Norton's theorem.

    (c)   Discuss the following terms

         (i) active and passive elements   (ii) unilateral and bilateral elements

    (d)   Draw graphical representation of impedance and current with respect to frequency in parallel resonance circuit.

    (e)   Explain analogy between electric and magnetic circuits.

    (f)   Explain B-H curve of a magnetic material.

    (g)   Why a single-phase induction motor does not develop starting torque? Explain.

2.   **Attempt any two parts of the following:** $(2 \times 5 = 10)$

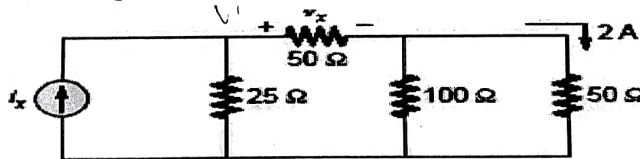   (a)   Find i_x and v_x in the circuit given below:

Fig.1

    (b)   Define Thevenin's theorem. Find Thevenin's voltage and Thevenin's resistance across terminals A and B.
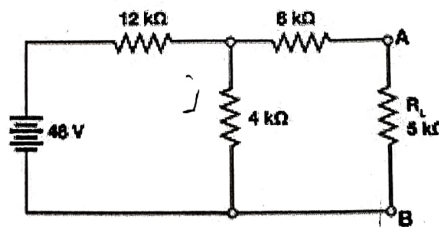

Fig.2

    (c)   (i). Explain Super Position theorem.

         (ii). Three resistances of 25, 30 and 35 ohms are connected in delta. Calculate the corresponding resistances in equivalent star connection.

3.   **Attempt any two parts of the following:** $(2 \times 5 = 10)$

    (a)   The alternating voltage is given by $v = 141.4 \sin 314t$. Find, (i) frequency (ii) RMS value (iii) average value (iv) the instantaneous value of voltage, when 't' is 5 millisecond, (v) the time taken for the voltage to reach 50 volt for the first time after passing through zero value.

(b) The voltage and current in a circuit with 50Hz supply are represented as follows.

$v = 280 \sin \omega t$ $i = 14.14 \sin (\omega t - \pi/6)$

Find, (i). RMS value of current (ii). Average value of voltage (iii). Power consumed in the circuit (iv).Draw the phasor diagram of current and voltage.

(c) (i). Write the necessity and advantages of the three phase system.

(ii). Discuss the apparent power, active power, reactive power, leading power factor and lagging power factor.

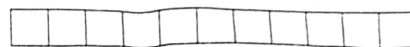**4.**   **Attempt any two parts of the following:**   **(2× 5 = 10)**

(a) A ring of ferromagnetic material has a rectangular cross-section. The inner diameter is 20 cm, the outer diameter is 24 cm, and the thickness is 4 cm. There is a coil of 600 turns wound on the ring. When the coil carries a current of 2.5 A, the flux produced in the ring is 1.2×10^{-3} Wb, Find; (i) magnetic field intensity (ii) Reluctance (iii) permeability.

(b) Explain working of single phase auto-transformer and mention its applications. Show that there will be saving of copper in auto-transformer in comparison to same rating of two winding transformer.

(c) Discuss the principle of operation of a single phase transformer; also draw its equivalent circuit. Derive emf equation for a single phase transformer.

5.   **Attempt any two parts of the following:**   **(2× 5 = 10)**

(a) Explain the torque speed characteristic and speed control of separately excited dc motor.

(b) Explain the principle of operation of three-phase induction motor and also explain its torque-slip characteristics with suitable diagram.

(c) Explain the principle of operation of single phase induction motor. Also, write the applications of the single phase induction motor.

Sr. No. **40488**

Sub_Code BHM-101

B. Tech. (CS, ME, EC)
Year: I Semester: First
Major Examination: 2022-23
Professional Communication

Time: 2 hrs

Max Marks: 50

Note: Attempt ALL questions.

Q1.		Attempt all Four parts of the following.	Marks	CO	BL	PO	PI Code
	a)	Compare different kinds of reports.	5	1	4	10	
	b)	What do you understand by skimming and scanning? Explain its role in comprehension.	5	3	1,4	11	
	c)	Discuss note-taking, note-making and summarising. Give one example.	5	1	2	10	
	d)	Describe Bibliography. How is it prepared?	5	1	2,1	12	
	e)	Define elocution. Why is it important?	5	1	1	11	
	f)	Describe what do you understand by an interview and different ways to face it.	5	2	2	9	
Q2.		Attempt any Three parts of the following.					
	a)	Elucidate active and passive vocabulary. How one can activate passive vocabulary?	5	3	2,1	10	
	b)	Explain the role of gestures, facial expressions and body posture in a Business Presentation.	5	2	4	12	
	c)	Are guess-making and prediction being same or different? Give a reason for your answer.	5	2	4	11	
	d)	Illustrate Graphics and Visuals in technical writing.	5	3	3	10	
Q3.		Attempt any Three parts of the following.					
	a)	Discuss Resume. Distinguish it from a CV?	5	2	1,4	9	
	b)	What do you understand by paragraph writing? Explain its types.	5	1	1,4	10	
	c)	How to prepare a Research Paper? Explain its use in Research.	5	1	3,4	12	
	d)	Illustrate the use of flow charts and diagrams in a given context. Substantiate it with a suitable example.	5	2	4	11	

Sr. No. 10137

BSM-142

Roll No.

B. Tech.
Year: I Semester: 2022-23
Major Examination: 2022.-23
Advanced Environmental Chemistry

Time: 3 Hrs.   Max Marks: 50

Note: Attempt ALL questions. ALL questions carry equal marks.

Q1.		Attempt any **Five parts** of the following. (All Units)	Marks	CO	BL	PO	PI Code
	a)	Name the major, minor and trace constituents of the atmosphere. Give their approximate percentage composition by volume.	2	1	1	7	
	b)	What is acid rain? Write a brief note on effects of acid rain on the environment.	2	4	2	7, 1	
	c)	Enumerate four major indoor pollutants and their effects.	2	3, 4	1	7	
	d)	What is nuclear waste? How it can be disposed off safely?	2	3, 4	2	7,1	
	e)	How groundwater gets contaminated? Explain.	2	4	2	7	
	f)	Write a short note on waste-water treatment using coagulation and flocculation method.	2	4	2	7, 1	
	g)	Write a short note on the fresh water sources.	2	4	2	7	
Q2.		Attempt any Two parts of the following. (Unit-I)					
	a)	Explain the conditions favouring the formation of photochemical smog and list the chemical reactions responsible.	5	1	2	7	
	b)	What is ozone layer? Explain its role. Explain the formation and depletion of ozone in the stratosphere.	5	1	2	7	
	c)	What are greenhouse gases and greenhouse effect? Discuss the potential and contribution of these gases to global warming phenomenon. How global warming can be controlled?	5	1	2	7	
Q3.		Attempt any Two parts of the following. (Unit-II)					
	a)	What are the sources of (a) NOx and (b) CO pollution in the atmosphere? What measures can be adopted to control these emissions?	5	1, 3	2	7	
	b)	How will you control sulphur dioxide and particulate emissions from thermal power plants?	5	1	2	7	
	c)	Explain the term "volatile organic compounds" or VOCs. What are the adverse effects VOCs on human health. How VOCs can be controlled?	5	1	2	7	

Q4.	Attempt any Two parts of the following. (Unit-III)					
a)	What are the common sources of water pollution? Discuss the various types of water pollutants. Suggest various remedial and control measures to minimise water pollution.	5	3	2	7	
b)	Discuss important characteristics of waste water. Give the outline of the waste-water treatment methods.	5	4	2	7	
c)	What is ocean pollution? What are its harmful effects? How its can be controlled.	5	4	2	7	
Q5.	Attempt any Two parts of the following. (Unit-IV)					
a)	What are the major sources of soil pollution ? How does soil pollution affect soil productivity? What measures can be taken to prevent soil pollution.	5	4	2	7	
b)	Write short notes on : (a) Soil Erosion. (b) Sewage treatment	5	4	2	7	
c)	What are the sources of urban and industrial solid wastes ? What adverse effects can solid wastes cause ? How can the solid waste be managed ?	5	4	2	7	

Sr. No. 10120

Sub Code BSM-127

Roll No.

B. Tech. (4 Credit Subjects)
Year: Ist, Semester: ODD
Major Examination: 2022-2023
Engineering Physics

Time: 3 Hrs.   Max Marks: 50

Note: Attempt ALL questions. Each question carries equal marks

Q1.		Attempt any Five parts of the following. (All Unit)	Marks	CO	BL	PO	PI Code
	a)	Distinguish between crystalline and amorphous materials.	2	1	1	1	
	b)	For an SC lattice of lattice parameter 2.014 Å, calculate the spacing between the lattice planes given by (212).	2	1	1	1	
	c)	What is wave–particle duality? What are the properties of matter-waves?	2	2	1	1	
	d)	What is uncertainty principle? How is this principle related to the concept of de Broglie hypothesis?	2	2	2	1	
	e)	Write the Maxwell's four equations in integral and differential forms. Explain the physical significance of each equation.	2	3	2	1	
	f)	The maximum electric field in a plane electromagnetic wave is 10^2N/C. The wave is going in the X-direction and the electric field is in the Y-direction. Find the maximum magnetic field.	2	4	2	1	
	g)	Explain the band theory of solids. Classify conductors, insulators and semiconductors on the basis of band theory of solids.	2	5	2	1	
Q2.		Attempt any Two parts of the following. (Unit-I)					
	a)	Explain the term interplanar spacing in a crystal. How it is different from Miller indices planes. Draw the plane corresponding to Miller indices $(\bar{1}00)$, (110), and $(\bar{1}\bar{1}1)$.	5	1	2	1	
	b)	Define all the symmetry element of a crystalline solid. Also explain their physical significance.	5	1	1	1	
	c)	The angle of reflection for monochromatic X-rays for a crystal whose atomic spacing is 2.0 Å is 30°. Calculate the wavelength of X-rays	5	1	1	1	
Q3.		Attempt any Two parts of the following. (Unit-II)					
	a)	Solve Schrödinger's wave equation for a particle in a one-dimensional infinite potential well. Calculate the values of energy of an electron in a one-dimensional box with impenetrable walls of length 1 Å for $n = 1$ and	5	2	2	1	

		$n = 2$.					
	b)	What is the importance of wave function in quantum mechanics? Derive time-dependent and time-independent Schrödinger wave equations.	5	2	1	1	
	c)	What is the lowest energy that a neutron of mass 1.67×10^{-27} kg can have if it is confined to move in an impenetrable box of length 2×10^{-14} m.	5	2	1	1	
Q4.		**Attempt any Two parts of the following. (Unit-III)**					
	a)	Define skin depth. Find the skin depth (d) at a frequency of 3.0×10^6 Hz in aluminium where $\sigma = 38.0 \times 10^6$ S/m and $\mu = 1$. Also, find out the propagation constant and the wave velocity.	5	3	2	1	
	b)	Derive the expression for wave equation of electromagnetic wave propagating in free space.	5	3	1	1	
	c)	Obtain Maxwell's four equations in free space. Discuss the modification in Ampere's law in terms of displacement current.	5	4	1	1	
Q5.		**Attempt any Two parts of the following. (Unit-IV)**					
	a)	Write down the characteristics of superconductors. Distinguish Type I and Type II superconductors. Discuss the variation of magnetic field in type I and II superconductors.	5	5	2	1	
	b)	Define critical temperature and critical field in superconductors. For an alloy superconductor, the critical fields are 1.4×10^5 A/m and 4.2×10^5 A/m, respectively, at 14 K and 13 K. Calculate its critical temperature.	5	5	1	1	
	c)	What is nanoscience and nanotechnology? Describe any one method used for the synthesis of nanomaterials.	5	6	1	1	

B.Tech.
Year: I   Semester: I
Major Examination-2022-2023
Subject Name: Calculus and Linear Algebra

Time: 3 hrs.   Max. Marks: 50
Note: Attempt all questions. All questions carry equal marks.

Q.1	Attempt any five parts of the following.	Marks	CO	BL	PO	PI CODE
a)	Use change of variables to show that $$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0.$$ Here $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$.	2	6	2	1	1.1.1
b)	Find the nth derivative of $\sin^2 x \cos^3 x$.	2	1	2	1	1.1.1
c)	Let A be matrix of order 3×3 such that $A^3 = A$, then find all the eigen values of matrix A.	2	2	2	1	1.1.1
d)	Show that every skew symmetric matrix of odd order is a singular matrix.	2	4	2	1	1.1.1
e)	Evaluate $$\int_0^1 x^{m-1}\left(\log\frac{1}{x}\right)^{n-1} dx, \quad m > 0, \quad n > 0.$$	2	5	2	1	1.1.1
f)	Show that $\beta\left(m, \frac{1}{2}\right) = 2^{2m-1}\beta(m, m)$.	2	4	2	1	1.1.1
g)	Find the directional derivative of a scalar function $\phi = (x^2 + y^2 + z^2)^{-1/2}$ at a point $(3, 1, 2)$ in the direction of the vector (yz, zx, xy).	2	4	2	1	1.1.1
Q.2	Attempt any Two parts of the following.					
a)	(i) If $u = \log(x^3 + y^3 - x^2 y - y^2 x)$, show that $$\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y}\right)^2 u = -\frac{4}{(x+y)^2}.$$ (ii) If $u = f(r)$, then show that $$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{2}{r}f'(r).$$ Here $x = r\cos\theta, y = r\sin\theta$.	5	6	3	1	1.1.1
b)	Use Taylor's series to prove that $$tan^{-1}(x + h) = tan^{-1}x + (h \sin\alpha)\frac{\sin\alpha}{1} - (h \sin\alpha)^2\frac{\sin 2\alpha}{2} + (h \sin\alpha)^3\frac{\sin 3\alpha}{3} - \dots\dots\dots,$$ where $\alpha = cot^{-1}x$.	5	2	3	1	1.1.1
c)	Find the shortest distance from origin to the surface $xyz^2 = 2$.	5	1	3	1	1.1.1
Q.3	Attempt any Two parts of the following.					
a)	Find the value of a and b for which the equations $$x + ay + z = 3, \quad x + 2y + 2z = b, \quad x + 5y + 3z = 9$$ has (i) Unique Solution (ii) No Solution (iii) Infinitely many	5	3	3	1	1.1.1

		solutions					
b)	(i)	Find the rank of the matrix $$A = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$$	5	3	3	1	1.1.1
	(ii)	Express the following matrix as sum of Hermitian and skew Hermitian matrix. $$A = \begin{bmatrix} 1+i & 2 & 5-5i \\ 2i & 2+i & 4+2i \\ -1+i & -4 & 7 \end{bmatrix}$$					
c)		Find the eigen values and eigen vectors of the matrix $$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$	5	6	3	1	1.1.1
Q.4		Attempt any Two parts of the following.					
a)	(i)	Evaluate $\iint_R \cos\frac{x-y}{x+y} dxdy$, where R is the region bounded by $x = 0,\ y = 0, x + y = 1$.	5	5	3	1	1.1.1
	(ii)	Find common area included between the parabolas $y^2 = 4a(x+a)$ and $y^2 = 4b(b-x)$.					
b)	(i)	Show that $\int_0^\infty \frac{x^a}{a^x} dx = \frac{\Gamma(a+1)}{(\log a)^{a+1}}$, $a > 1$.	5	5	3	1	1.1.1
	(ii)	Express $\int_0^{\frac{a}{\sqrt{2}}} \int_0^x xdydx + \int_{\frac{a}{\sqrt{2}}}^a \int_0^{\sqrt{a^2-x^2}} x\, dydx$ as a single integral and hence evaluate it.					
c)		Find the volume and the mass of the solid region contained in the first octant of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$, if the density ρ at any point (x, y, z) is $kxyz$.	5	5	3	1	1.1.1
Q.5		Attempt any Two parts of the following.					
a)	(i)	Evaluate $\int_C (x^2 + y^2)dx + (y + 2x)dy$, where C is the boundary of the region in the first quadrant, bounded by the curves $y^2 = x$ and $x^2 = y$.	5	4	3	1	1.1.1
	(ii)	Use Green's theorem to find the value of line integral $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = y^3\hat{i} - x^3\hat{j}$ and C is the circle $x^2 + y^2 = a^2$.					
b)		Using stokes theorem, evaluate $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = y^2\hat{i} + x^2\hat{j} - (x+z)\hat{k}$ and C is the boundary of the triangle with vertices $(0,0,0), (1,0,0)$ and $(1, 1, 0)$.	5	4	3	1	1.1.1
c)		Verify Gauss divergence theorem for vector field $\vec{F} = 4x\hat{i} - 2y^2\hat{j} + z^2\hat{k}$ taken over the region bounded by the cylinder $x^2 + y^2 = 4, z = 0,\ z = 3$.	5	4	3	1	1.1.1