14MA201

Hall Ticket Number:

I/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION

May, 2018 **Common to all branches**

Second Semester **Engineering Mathematics-II**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)
   a) Solve $x\,dy - y\,dx = 0$.
   b) Define Orthogonal trajectories.
   c) Find the Integrating factor of $\left(1+y^2\right)dx = \left(\tan^{-1} y - x\right)dy$.
   d) Solve the differential equation $\frac{d^2y}{dx^2} + y = 0$.
   e) State Euler-Cauchy equation.
   f) Write the differential equation of R-L-C circuit with an e. m. f $E \sin \omega t$.
   g) Find Laplace transform of t^2e^{2t} .
   h) Define Unit step function.
   i) Find inverse Laplace transform of $\frac{s^2-3s+4}{s^3}$.
   j) Prove that $\overline{A} = (x+3y)\bar{i} + (y-2z)\bar{j} + (x-2z)\bar{k}$ is solenoidal.
   k) Fid the normal vector to the surface $x^3 + y^3 + 3xyz = 3$ at the point (1,2,-1).
   l) State Stoke's theorem.

UNIT I

2. a) Solve $\cos\left(x+y\right)dx + \left(3y^2 + 2y + \cos\left(x+y\right)\right)dy = 0$. 6M
   b) A thermometer reading 5 ℃ is brought into a room whose temperature is 22℃. One minute later the thermometer reading is 12℃ .How long does it take until the reading is practically 21.9 ℃. 6M

(OR)

3. a) Solve the differential equation $y' + 2y = y^2$. 6M
   b) If in a culture of yeast the rate of growth $y'(t)$ is proportional to the amount $y(t)$ present at time t, and if $y(t)$ doubles in 1 day, how much can be expected after 3 days at the same rate of growth? 6M

UNIT II

4. a) Solve the initial value problem $y''+0.2y'+4.01y = 0,\ y\left(0\right) = 0,\ y'\left(0\right) = 2$. 6M
   b) Solve the differential equation $\frac{d^2y}{dx^2} + 4y = \tan\left(2x\right)$ by the method of variation of parameters. 6M

(OR)

5. a) Solve the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 4y = 2x^2 + 3e^{-x}$ by the method of undetermined coefficients. 6M
   b) Solve the differential equation $x^2y'' + 7xy' + 13y = 0$. 6M

UNIT III

6. a) Find the Laplace transform of $\int_0^t \frac{e^{-t}\sin t}{t}\,dt$. 6M
   b) Solve the differential equation $\frac{d^2x}{dt^2} + 9x = \cos\left(2t\right),\ x(0) = 0, x'\left(0\right) = 1$ by using Laplace transforms. 6M

(OR)

7. a) Using convolution theorem, find the inverse Laplace transform of $\frac{s^2}{\left(s^2+a^2\right)\left(s^2+b^2\right)}$. 6M

   b) Find the inverse Laplace transform of $(i)\ \log\left(\frac{s+a}{s+b}\right)$ and $(ii)\tan^{-1}\left(\frac{2}{s}\right)$. 6M

UNIT IV

8. a) Find the constants a,b,c so that the vector $\overline{A} = (x + 2y + az)\bar{i} + (bx - 3y - z)\bar{j} + (4x + cy + 2z)\bar{k}$ is irrotational. Also find it's scalar potential function. 6M

   b) Verify Green's theorem for $\int (xy + y^2)\,dx + (x^2)\,dy$ over the curve C, where C is the region bounded by $y = x$ and $y = x^2$. 6M

(OR)

9. a) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point P(1,2,3) in the direction of the line PQ , Q is the point (5,0,4). 6M

   b) Using Gauss-divergence theorem evaluate $\iint_S F.n\,dS$ for $\overline{F} = (x^2 - yz)\bar{i} + (y^2 - xz)\bar{j} + (z^2 - xy)\overline{k}$ taken over the rectangular paralellopiped $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$. 6M

14PH202/PH122

Hall Ticket Number:

I/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION

May, 2018 **Common to all branches**

Second Semester **Engineering Physics-II**

Time: Three Hours **Maximum:** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)
   a) List any two failures of classical free electron theory.
   b) Describe charge carrier hole in semiconductors.
   c) Explain diffusion current in semiconductors.
   d) What is Bohr Magneton?
   e) Classify soft and hard magnetic materials.
   f) Define dielectric constant.
   g) Describe quantum confinement in nanomaterials.
   h) Compare type-I and type-II superconductors.
   i) List any two applications of superconductors.
   j) State any two properties of ultrasonics.
   k) What is ultrasonic imaging?
   l) Describe Miller indices of crystal planes.

UNIT I

2. a) Explain Kronig- Penny Model for free electrons moving in solids 6M
   b) Obtain carrier concentration in intrinsic semiconductors 6M

(OR)

3. a) Explain the quantum free electron theory of metals and the temperature dependence of conductivity based on Fermi-Dirac distribution function 8M
   b) Find the concentration of electrons and holes in n-type silicon at 300K, if the conductivity of silicon is $3X10^{4}$ $ohm^{-1}m^{-1}$,mobility of the electrons in silicon is $1300X10^{-4}$ m^2/Vs and Intrinsic carrier density is $1.5X10^{16}$ m^3 4M

UNIT II

4. a) Explain domain theory of Ferro magnetism and the B-H hysteresis curve 6M
   b) Obtain Classius-Mossotti relation in dielectric materials 6M

(OR)

5. a) Describe the magnetic ferrite materials and list their applications 6M
   b) Explain the frequency dependence of dielectric polarization 6M

UNIT III

6. a) Explain the fabrication of Nano materials by chemical vapour deposition method 6M
   b) Describe the working principle of solar cell, LED and photo diode 6M

(OR)

7. a) Explain the mechanical, chemical, optical properties of Nano materials 6M
   b) Explain the three critical parameters (a) temperature, (b) magnetic field and (c) current of the superconducting materials 6M

UNIT IV

8. a) Explain the properties and applications of ultrasonics 6M
   b) Describe the ultrasonic method of time of flight diffraction technique 6M

(OR)

9. a) Explain the construction and working of Geiger-Muller counter 8M
   b) X-rays of 1.5418 X 10^{-10} m wavelength are diffracted by (111) planes of a crystal at an angle 30° in the first order. Find the inter atomic spacing in the crystal. 4M

Brief Scheme of evaluation - SET -1

I/IV B.Tech (Regular) DEGREE EXAMINATION

May, 2018

(SECOND SEMESTER)
ENGINEERING PHYSICS-II
COMMON TO ALL BRANCHES

Time: Three Hours **Maximum :** 60 Marks

(1X12 = 12 Marks)

1			(1X12=12 Marks)
	a)	Any two failures of free electron theory of metals	1M
	b)	Description of hole	1M
	c)	Diffusion process	1M
	d)	Expression for Bohr magnetron	1M
	e)	Classification of hard and soft magnetic materials	1M
	f)	Breakdown and strength	1M
	g)	Quantum confinement	1M
	h)	Any two comparisons of type-I and type-II superconductors	1M
	i)	Any two applications of superconductors	1M
	j)	Any two properties of ultrasonic waves	1M
	k)	Ultrasonic imaging	1M
	l)	Miller indices	1M

Answer ONE question from each unit. (4X12=48 Marks)

2
a) Periodic potential wells (2 M), SWE application (2M)electron energies(2 marks)
b) Intrinsic semiconductor(2M), the no of carriers in conduction band (2M) and the no of carriers in valance band expression(2M)

3
a) Salient features of Q.F.T (4M),F.D function and explanation (2M), temperature variation and function behavior (2M),
b) $\sigma = ne\mu_e$ and $p= n_i^2/n$ (2M) Result $n= 1.442X10^{24}\ m^{-3}$ and $p = 1.56X10^{8}\ m^{-3}$ (2M)

4
a) Domain theory (4M) B-H curve (2M)
b) Derivation of CM relation Polarization $P =N\alpha E_{loc}$ (2M) $P = \varepsilon_0 E(\varepsilon_r -1)$ (1M) $Eloc = E +P/3\varepsilon_0$ (1M), and final expression (2M)

5
a) Ferrite properties and examples (4M) and any twor applications (2M)
b) Dipolar frequency dependence (2M), ionic frequency dependence (2M) and electronic frequency dependence (2M)

6
a) Principle (2M), apparatus (2M) and working CVD (2M)
b) Solar cell with figure and principle (2M), LED with figure and principle (2M) and photo diode with figure and principle (2M)

7
a) mechanical (2M) ,Chemical (2M) and optical(2M) properties
b) Critical temperature (2M) critical magnetic field (2M) and Critical current (2M)

8
a) properties (3M) and applications of ultrasonics (3M)
b) principle (2M) apparatus (2M) and working (2M)

9
a) Principle (2M) construction (2M) working (4M)
b) $2d \sin\theta = n\lambda$ (1M) $d=a/(h^2+k^2+l^2)^{1/2}$ (1M) $a= 2.67X10^{-10}$ m (2M)

14CY203(Y16)

Hall Ticket Number:

I/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION

May, 2018 **Common to all branches**

Second Semester **ENGINEERING CHEMISTRY- II**

Time: Three Hours **Maximum:** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)
   a) What is meant by degree of polymerization?
   b) Write the preparation of Buna- S.
   c) What is the repeating unit of Nylon-6,6?
   d) Why the glass electrode cannot be used for solution of pH above 9?
   e) Write any two applications of solar panels.
   f) What is the difference between reversible and irreversible cells?
   g) What is Pilling-Bedworth rule?
   h) Why galvanized utensils are not used for storing food stuffs?
   i) What are green solvents? Give one example.
   j) State Beer-Lamberts law.
   k) Name two flue gases used in flame photometry.
   l) What is conductometry?

UNIT I

2. a) Discuss the types of polymerization reactions with suitable example 6M
   b) Explain the mechanism of Ziegler Natta polymerization 6M

(OR)

3. a) Write the preparation, properties and uses of Bakelite. 6M
   b) What is vulcanization? Explain the advantages of vulcanization. 6M

UNIT II

4. a) Derive Nernst's equation and explain its applications. 6M
   b) Explain the construction and working calomel electrode. 6M

(OR)

5. a) Describe the working of lead-acid battery and write necessary chemical reactions. 6M
   b) Define fuel cell. Explain the construction and working of H_2- O_2 fuel cell. 6M

UNIT III

6. a) Explain the mechanism of electrochemical theory of corrosion. 6M
   b) Describe in detail about cathodic protection. 6M

(OR)

7. a) What is electroless plating? Explain the process of electroless plating of Nickel 6M
   b) What is green chemistry? Narrate the important applications of green chemistry. 6M

UNIT IV

8. a) Describe the colorimetric method for the determination of Fe (II) in solution. 6M
   b) Describe the working of flame photometry with a neat sketch of its block diagram 6M

(OR)

9. a) What is potentiometry? How do you estimate Iron (II) with $K_2Cr_2O_7$ potentiometrically? 6M
   b) Discuss the principle involved in atomic absorption spectrometry 6M

1. Answer all questions 1x12=12M

UNIT-I

2. a. Derivation of Nernst's equation -4M
   Minimum four applications - 2M
   b. Construction of calomel electrode -2M
   Working-2M
   Determination of pH-2M
   (OR)
3. a. Electrochemical series -3M
   Significance -3M
   b. Determination of concentration of Fe-II using potentiometer-6M

UNIT-II

4. a. Mechanism of wet corrosion- Evolution of hydrogen type - 3M
   Absorption of oxygen -3M

   b. Cathodic protection - Sacrificial anodic method -3M
   Impressed cathodic protection-3M

   (OR)
5. a. Definition of electroless plating and applications-2M
   Mechanism of electroless plating-4M
   b. Twelve principles of green chemistry -6M

UNIT-III

6. a. Definition of cracking with reaction-2M

   Mechanism of fixed bed catalytic cracking with neat dia-4M

   b. Manufacturing of gasoline by Fisher-Tropsch method with neat diagram-6M

   (OR)
7. a. Terms of phase rule- Definition phase with two examples-2M
   Component with two examples -2M
   Degrees of freedom with two examples -2M
   b. Reduced phase rule-2M
   Definition of Eutectic system with examples-2M
   Cooling curves-2M

UNIT-IV

8. a. Beer-Lamberts law- Derivation-4M
   Significance-2M
   b. Determination of Iron by colorimetry-6M
   (OR)
9. a. Flame photometry- principle with diagram-2M
   Estimation of sodium-4M
   b. Atomic absorption spectroscopy – Principle and Block diagram-2M
   Explanation -4M