AR20

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Discuss Ion Exchange Process for softening of hard water with neat sketch.   6M
   b) Calculate the total ,temporary and permanent hardness for 10,000 ml of water   4M
      containing the following salts $Ca(HCO_3)_2$ = 16.2 mg/L; $Mg(HCO_3)_2$ =1.46 mg/L;
      $CaSO_4$ =13.6 mg/L ; $MgSO_4$ =6.0 mg/L; $MgCl_2$ =9.5 mg/L; and $CaCl_2$= 11.1mg/L.

(OR)

2. a) Define Break point chlorination.   2M
   b) Discuss the methods of Treatment of Water for Domestic Purposes.   8M

UNIT-II

3. a) Write the priciple of NMR spectroscopy. Explain about Coupling Constant.   6M
   b) Define Fingerprint Region. Explain about chemical shift.   4M

(OR)

4. a) Write the different types of electronic transitions involved according to UV visible   6M
      spectroscopy.
   b) Discuss about the stretching and bending vibrations in IR spectroscopy   4M

UNIT-III

5. a) Explain Compounding of Plastics with suitable examples.   5M
   b) Define plastics. Differentiate Thermoplastics from Thermosetting Plastics   5M

(OR)

6. a) Discuss preparation, properties and engineering uses of Bakelite polymer.   5M
   b) Define addition and condensation polymerizations with suitable examples.   5M

UNIT-IV

7. a) Describe the reactions of unimolecular and bimolecular elimination reactions with   4M
      examples.
   b) Explain the reaction and mechanism of Claisen Rearrangement   6M

(OR)

8. a) Explain the reaction of electrophilic addition reactions with suitable example.   4M
   b) Explain the reaction and mechanism of Pinacol Pinacolone Rearrangement.   6M

UNIT-V

9. a) Explain the principle and process of galvanizing with neat sketch.   6M
   b) Write the principle and process of corrosion control by impressed current cathode   4M
      protection with neat diagram

(OR)

10. a) Write any six factors influencing corrosion   6M
    b) Explain mechanism of electrochemical corrosion oxygen absorption type method.   4M

UNIT-VI

11. a) Explain any six principles of green chemistry.   6M
    b) Differenciate Batteries from Supercapacitors.   4M

(OR)

12. a) Write a note on renewable & non-renewable energy sources   6M
    b) Define photo voltaic cell and photovoltaic effect.   4M

AR20

CODE: 20BST106   SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, September, 2023
ENGINEERING PHYSICS
(Mechanical Engineering)

Time: 3 Hours   **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Show that for a simple harmonic oscillator, mechanical energy remains constant and it is proportional to the square of the amplitude.	8M
	b)	What are the characteristics of Simple Harmonic Oscillator?	2M

(OR)

2.	a)	Define Damped and forced oscillations .	2M
	b)	What are forced oscillations? Obtain an expression for the amplitude of forced oscillator and give the condition for amplitude resonance.	8M

UNIT-II

3.	a)	Explain the principle of superposition of waves.	2M
	b)	Discuss the phenomenon of thin films and obtain the conditions for maxima and minima.	8M

(OR)

4.	a)	A plane transmission grating having 4250 lines per cm is illuminated with sodium light normally. In second order spectrum the spectral lines are deviated by 30^0. Find the wavelength of spectral line.	2M
	b)	Obtain the condition for primary and secondary maxima in Fraunhofer diffraction due to single slit and draw the intensity distribution curve.	8M

UNIT-III

5.	a)	With suitable diagrams, explain the principle, construction and working of Ruby laser.	8M
	b)	Define the terms *(i)* life time *(ii)* metastable state	2M

(OR)

6.	a)	What are the necessary conditions for lasing action?	8M
	b)	Write short notes on population inversion	2M

UNIT-IV

7.	a)	Discuss the various advantages of optical fibers.	2M
	b)	Describe different types of fibers by their refractive index profile and propagation	8M

(OR)

8.	a)	Calculate the acceptance angle and numerical aperture of an optical fiber, if the refractive indices of the core and cladding are 1.56 and 1.49 respectively.	2M
	b)	Describe the construction of an optical fiber and give dimensions of various parts.	8M

UNIT-V

9.	a)	Define coordination number and packing fraction	2M
	b)	Describe the seven crystal systems with neat diagrams	8M

(OR)

10.	Illustrate the SC, BCC and FCC crystal structures.	10M

UNIT-VI

11.	a)	Draw the B-H curve for a ferromagnetic material and identify the retentivity and coercive field on the curve.	8M
	b)	Find the relative permeability of a ferromagnetic material if a field of strength 220*amp/m* produces a magnetization of 3300 *amp/m* in it	2M

(OR)

12.	a)	Explain Meissner effect.	4M
	b)	How are superconductors classified?	6M

AR20

CODE: 20BST105   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, September, 2023

APPLIED PHYSICS
(Common to CE, CSD, AIML & IT Branches)

Time: 3 Hours   Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Outline the phenomenon of Interference in thin films due to reflected light.	6 M
	b)	A parallel beam of light of wavelength 5890A$^{\circ}$ is incident on a glass plate (μ= 1.5) such that angle of refraction in to plate is 60°. Calculate the smallest thickness of the plate which will make it appear dark by reflection.	4 M

(OR)

2.	a)	What is Diffraction? Explain clearly the differences between Interference and Diffraction.	6 M
	b)	In Newton's Ring's experiment, the diameter of the 5th ring was 0.3 cm and the diameter of the 25th ring was 0.8cm. If the radius of curvature of the Plano convex lens is 100 cm. find the wavelength of light used.	4 M

UNIT-II

3.	a)	Analyse how laser light is different from ordinary light.	3 M
	b)	Interpret the process of Spontaneous and Stimulated emission of light. Spontaneous emission dominates over Stimulated emission – justify your answer.	7 M

(OR)

4.	a)	With a neat diagram explain the construction and working of Ruby Laser.	8 M
	b)	A three level laser emits a light of wavelength 5500A^{0}. Calculate the energy of each Photon. (Planck's constant is 6.625 x 10^{-34}Js.	2 M

UNIT-III

5.	a)	With a neat diagram, describe the structure of an optical fiber.	5 M
	b)	Memorize the propagation of light through Optical fiber using the concept of Total internal reflection.	5 M

(OR)

6.	a)	Illustrate propagation of light through various types of optical fibers.	6 M
	b)	Write the important applications of optical fibers in communication.	4 M

UNIT-IV

7.	a)	Interpret wave and particle duality.	4 M
	b)	Explain de-Broglie's hypothesis of matter waves and derive an expression for de-Broglie wavelength of an electron accelerated through a potential V.	6 M

(OR)

8.	a)	Formulate time independent Schrodinger wave equation.	6 M
	b)	Calculate the energy difference between the ground state and first excited state for an electron in a box of length 1 A^{0}.	4 M

UNIT-V

9. a) Recall the concept of electric field and deduce an expression for electric intensity due to a point charge.   6 M

    b) A very large sheet of charge has density of 5 $\mu C/m^2$. Determine the electric field at a distance of 25 cm.   4 M

(OR)

10. a) State and explain Biot-Savart's law.   6 M

    b) List Maxwell's equations in differential form.   4 M

UNIT-VI

11. a) At high temperature, an extrinsic semiconductor behaves like an intrinsic one- Give reasons   4 M

    b) Discuss drift and diffusion currents in Semiconductors.   6 M

(OR)

12. a) Develop the expression for Hall Coefficient and write its significance.   7 M

    b) In copper, there are 5 x 10^{28} atoms/m^3. Find the Hall coefficient.   3 M

CODE: 18BST106   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, September, 2023

Applied Physics
(Common to CSE, EEE & IT Branches)

Time: 3 Hours   Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) What are the conditions for sustained interference?   4M
    b) Prove that the diameter of nth dark ring in a Newton's ring set-up is directly proportional to the square root of the ring number.   8M

(OR)

2. a) Explain the Fraunhofer diffraction at a double slit   8M
    b) A parallel beam of light is incident normally on a plane grating having 4300 lines/cm. A second order spectral line is found to be deviated through an angle of 30^0. Determine the wavelength of the spectral line.   4M

UNIT-II

3. a) Describe an optical fiber with neat diagram.   4M
    b) Explain briefly about the classification of optical fibers.   8M

(OR)

4. a) A step index fibre has a co of refractive index 1.5. If the NA of the fiber is 0.26, calculate the refractive of the cladding material.   4M
    b) Explain the propagation of light through an optical fiber.   8M

UNIT-III

5. a) Explain briefly about wave particle duality. Derive expression for wavelength of matter wave.   8M
    b) State and explain Heisenberg's uncertainty principle.   4M

(OR)

6. a) What is the physical significance of wave function?   4M
    b) Derive the expression for wave function in case of particle in a box.   8M

UNIT-IV

7. a) Write a short note on Gauss law.   4M
    b) Derive the differential form of Maxwell equations in electromagnetism.   8M

(OR)

8. a) State and explain Biot-Savart law.   4M
    b) State Ampere's law and derive the expression for magnetic field due to long straight conductor carrying current.   8M

UNIT-V

9. a) An n-type semiconductor specimen has a Hall coefficient 3.66×10^{-11} m^3/As. The conductivity of the specimen is found to be 112×10^{-15} m^3/As. Calculate the charge carrier density n.   4M
    b) What is Hall effect? Derive the expression for Hall coefficient.   8M

(OR)

10. a) What is diffusion current? Derive the expression for it.   8M
    b) Define the terms conductivity and resistivity.   4M

AR18

CODE: 18BST108   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, September, 2023
CHEMISTRY
(Common to CE, ME, ECE Branches)

Time: 3 Hours   Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Discuss the postulates of VSEPR theory	6M
	b)	Describe dsp^2 and sp^3d^2 hybridization with suitable examples	6M
		(OR)	
2.	a)	Define ionization potential? Explain factor effecting ionization potential	6M
	b)	Draw the MO diagrams for O_2 and CO and explain.	6M

UNIT-II

3.	a)	Write a note on spin-spin coupling and chemical shifts	8M
	b)	Enumerate the significance of fingerprint region of IR	4M
		(OR)	
4.	a)	Explain the concepts of fluorescence and phosphorescence with Jablonski diagram	8M
	b)	Give two examples each for auxochrome and chromophores	4M

UNIT-III

5.	a)	With a neat sketch explain the construction, working and uses of calomel electrode	8M
	b)	What is electrochemical series? Write its importance.	4M
		(OR)	
6.	a)	Outline the mechanism of electrochemical corrosion	6M
	b)	Discuss how proper design of machine controls corrosion.	6M

UNIT-IV

7.	a)	Distinguish between SN^1 and SN^2 reactions.	8M
	b)	Explain the mechanism of E_{CB} mechanism with suitable examples	4M
		(OR)	
8.	a)	Discuss addition and condensation polymerization with suitable examples	8M
	b)	"Ethylene and styrene are bifunctional monomers"- justify.	4M

UNIT-V

9.	a)	Explain any six principles of green chemistry	6M
	b)	Explain the construction and working photovoltaic cell.	6M
		(OR)	
10.	a)	Elaborate the charging and discharging in lead acid battery.	6M
	b)	Differentiate between batteries and supercapacitors.	6M

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