

Code No: 151AF

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

CHEMISTRY
(Common to EEE, CSE, IT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub-questions.

PART- A

(25 Marks)

- 1.a) What is band structure of solids. [2]
- b) How is portable water disinfected by ozonation? [2]
- c) What is standard electrode potential? [2]
- d) What is specific rotation? [2]
- e) What is nuclear magnetic resonance? [2]
- f) Give the molecular energy diagrams of O_2 . [3]
- g) What is Caustic embrittlement? [3]
- h) Why small anodic area undergo intense corrosion? [3]
- i) Explain Grignard addition on carbonyl compounds. [3]
- j) State and explain Lambert-Beer law. [3]

PART-B

(50 Marks)

- 2.a) Explain the bond order in N_2 molecule.
- b) Discuss briefly the molecular orbital theory?
- c) Give the crystal field splitting pattern of d-orbitals in octahedral geometry. [3+4+3]

OR

- 3.a) What are the differences between bonding and antibonding orbitals?
- b) What are the salient features of crystal field theory?
- c) Give the crystal field splitting pattern of d-orbitals in tetrahedral geometry. [3+4+3]

- 4.a) Explain the principle involved in the complexometric method of determination of the hardness of water.
- b) Explain the disinfection of water by Chlorination.
- c) Give the Ion-exchange process for softening of hard water. [4+3+3]

OR

- 5.a) What are the disadvantages of boiler corrosion? Explain how such corrosion is prevented.
- b) What is hardness of water? Give the various units of hardness.
- c) Calculate the temporary, permanent and total hardness of water sample containing following impurities:

$Mg(HCO_3)_2 = 16.8 \text{ mg/L}$, $MgSO_4 = 24.0 \text{ mg/L}$ and $NaCl = 58.5 \text{ mg/L}$.

[3+4+3]

- 6.a) Describe the construction and working of standard calomel electrode.
b) What is corrosion? Explain the theory of chemical corrosion.
c) Derive Nernst equation.

[4+3+3]

- OR
7.a) What is a battery? Explain the functioning of Li ion battery.
b) Explain the factors affecting the rate of corrosion.
c) What is electrochemical series? Give its applications.

[4+3+3]

- 8.a) Describe the conformational isomers of n-butane.
b) Explain the mechanism of dehydro halogenation of alkylhalides.
c) Discuss reduction of carbonyl compounds using LiAlH_4 .

[4+3+3]

- OR
9.a) Write the possible optical isomers in tartaric acid.
b) Explain the nucleophilic substitution reaction mechanism.
c) Discuss oxidation mechanism of alcohols using KMnO_4 .

[3+4+3]

- 10.a) What is meant by shielding and deshielding of a proton nucleus?
b) Explain the principle of UV spectroscopy.
c) Explain the applications of IR spectroscopy.

[3+4+3]

- OR
11.a) Explain the principle of NMR spectroscopy.
b) Why methane does not absorb IR energy.
c) What are different electronic excitations in UV spectroscopy?

[4+3+3]

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Code No: 151AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

PROGRAMMING FOR PROBLEM SOLVING

(Common to CE, ME, ECE, EIE, MCT, MMT, AE, MIE, PTM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Give a brief note on storage class. [2]
- b) Give a note on unions. [2]
- c) How can we determine whether a file is successfully opened or not using fopen() function? [2]
- d) Give syntax to create a pointer to function. [2]
- e) How binary search works? [2]
- f) What is a flowchart? How it is different from an algorithm? [3]
- g) Write the advantages and disadvantages of using pointers. [3]
- h) Write a 'C' program to read a binary file and print it on console [3]
- i) Write short notes on dynamic memory allocation. [3]
- j) How linear search is different from binary search? [3]

PART - B**(50 Marks)**

- 2.a) Explain typical steps for entering, compiling and executing 'C' programs.
 - b) Write an algorithm to find the roots of a quadratic equation considering all cases. [5+5]
- OR**
- 3.a) Distinguish between all loop statements along with a flowchart and with an example program.
 - b) Write a program in 'C' to check whether a given integer number is odd or even. [5+5]
- 4.a) Give a brief note on Enumeration data type.
 - b) Write a 'C' program to find the biggest number and smallest number of given 'n' numbers using arrays. [5+5]
- OR**
- 5.a) Why structures are necessary? Explain Nested Structures with a valid example.
 - b) Give a detailed note on pointer expressions. [5+5]
- 6.a) Explain Steps for file operations and different modes of files.
 - b) Explain about preprocessor commands define, undef. [5+5]
- OR**
7. Write a program to read a text file, convert all the lowercase characters into upper case and re-write the uppercase characters in the file. [10]

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8. What is Recursion? Write a 'C' Program for Towers of Hanoi. Also specify in diagram for it. [10]

OR

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- 9.a) How to pass the structure to functions as an argument? Explain with a suitable example.
b) Explain about Allocating memory for arrays of different data types. [5+5]

- 10.a) Give a brief note on insertion sort with an example.
b) Discuss the time complexity of the bubble sort. [5+5]

OR

11. Write a program in 'C' to print list of integers in ascending order using bubble sort and selection sort techniques. [10]

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Code No: 131AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech I Year I Semester Examinations, May/June - 2019****MATHEMATICS-II****(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A**(25 Marks)**

- 1.a) Find L[Sint Cost]. [2]
- b) State convolution theorem. [3]
- c) Evaluate $\int_0^1 x^3 \sqrt{1-x} dx$. [2]
- d) Evaluate $\int_0^{\pi/2} \sqrt{\sec \theta} d\theta$. [3]
- e) Find the limits after changing the order for $\int_0^1 \int_{x^2}^{2-x} x^2 dx dy$. [2]
- f) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$. [3]
- g) If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ then find $\text{div } \vec{r}$. [2]
- h) State Gauss's Divergence theorem. [3]
- i) If S is any closed surface enclosing a volume V and $\vec{F} = x\vec{i} + 2y\vec{j} + 3z\vec{k}$ then find $\iiint \vec{F} \cdot \vec{n} ds$. [2]
- j) If $\phi = x^2 + y^2 + z^2 - 3xyz$ then find $\text{curl}(\text{grad } \phi)$. [3]

PART-B**(50 Marks)**

2. Find the Laplace transform of the saw-toothed wave of period T, given $f(t) = \frac{k}{T}t$, when $0 < t < T$. [10]

OR

3. Using Laplace transform, solve $(D^2 + 4D + 5)y = 5$, given that $y(0) = 0$, $y'(0) = 0$. [10]

4. Prove that $\frac{\beta(p, q+1)}{q} = \frac{\beta(p+1, q)}{p} = \frac{\beta(p, q)}{p+q}$ where $p > 0, q > 0$. [10]

OR

5. Prove that $\Gamma\left(\frac{1}{2}\right)\Gamma(2n) = 2^{2n-1}\Gamma(n)\Gamma\left(n + \frac{1}{2}\right)$. [10]

- 6.a) Evaluate $\int_0^1 \int_0^{x^2} e^{y/x} dy dx$.

- b) Evaluate the integral by changing the order of integration $\int_0^3 \int_1^{\sqrt{4-y}} (x+y) dx dy$. [5+5]

OR

7. Find by triple integration, the volume of the solid bounded by the co-ordinate planes $x=0, y=0, z=0$ and the plane $x+y+z=1$. [10]

8. Find the values of a and b so that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ may intersect orthogonally at the point $(1, -1, 2)$. [10]

OR

9. Find the angle of intersection of the spheres $x^2 + y^2 + z^2 = 29$ and $x^2 + y^2 + z^2 + 4x - 6y - 8z - 47 = 0$ at the point $(4, -3, 2)$. [10]

10. Verify Stoke's theorem for $\vec{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$ taken round the rectangle bounded by the lines $x = \pm a, y = 0, y = b$. [10]

OR

11. Verify Green's theorem for $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where 'C' is the region bounded by $x=0, y=0, x+y=1$. [10]

Code No: 121AD

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

ENGINEERING PHYSICS

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, AME, MIE, PTM, CEE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) What is Ionic Bond? [2]
- b) What is Hydrogen Bond? [3]
- c) Write two important properties of Matter Waves. [2]
- d) What is the main difference between Micro Canonical and Canonical Ensembles? [3]
- e) What is Polarizability? [2]
- f) What is the Magnetization? [3]
- g) Write applications of lasers. [2]
- h) Define Numerical Aperture. [3]
- i) Explain about top down approach for synthesis of nanomaterials. [2]
- j) What is Sabine's Formula? Explain. [3]

PART-B

(50 Marks)

- 2.a) What is packing fraction? Deduce packing factor for BCC structure.
 - b) Write notes on Frenkel and Schottky defects with diagrams. [5+5]
- OR**
- 3.a) Explain with suitable examples the covalent and metallic type of bondings in solids.
 - b) Write a note with neat diagram of Structure of Diamond. [5+5]
- 4.a) Derive an expression for Schrödinger's Time Independent Wave Equation.
 - b) Describe Concept of Effective Mass of an Electron. [5+5]
- OR**
- 5.a) Write an essay on Davisson and Germer's Experiment.
 - b) Explain Origin of Energy Band Formation in Solids. [5+5]

- 6.a) Derive an expression for electronic polarizability in terms of the radius of the atom.
b) Write short notes on piezoelectricity. [5+5]

OR

- 7.a) Write notes on Type-I and Type-II Superconductors along with the applications of Superconductors.
b) Discuss about Meissner Effect. [5+5]

- 8.a) Discuss about Diffraction grating experiment with the help of diagram.
b) Write short notes on Nicol prism. [5+5]

OR

- 9.a) Write an essay on construction and working of Helium-Neon Laser.
b) What is the importance of the Attenuation in Optical Fibers? [5+5]

- 10.a) Write an essay on Chemical Vapour Deposition.
b) Discuss about Solar cell, LED and Photo Diodes. [5+5]

OR

- 11.a) What are the factors affecting the architectural acoustics and suggest their remedies.
b) Write notes on Quantum Confinement. [5+5]

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R16

Code No: 131AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

ENGINEERING PHYSICS - I

(Common to EEE, ECE, CSE, EIE, IT, ETM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Define temporal and spatial coherence. [2]
- b) Explain the significance of beam splitter in Newton's rings experiment. [3]
- c) Write applications of nicol prism. [2]
- d) What is the importance of population inversion? [3]
- e) What is total internal reflection? Explain. [2]
- f) Write any four applications of optical fibers. [3]
- g) Define space lattice, unit cell and lattice parameters. [2]
- h) Calculate packing fraction of simple cube. [3]
- i) State and explain Bragg's law. [2]
- j) Discuss about line defects. [3]

PART-B**(50 Marks)**

- 2.a) Explain interference in thin films in reflected light.
 - b) Describe experimental setup of Newton's rings experiment and obtain expression for radius of curvature of plano-convex lens. [5+5]
- OR**
- 3.a) Compare Fresnel's and Fraunhofer diffraction.
 - b) Discuss in detail about diffraction grating experiment. [5+5]
- 4.a) Describe construction and working of a nicol prism.
 - b) Establish relation between Einstein's coefficients. [5+5]
- OR**
- 5.a) Write in detail about quarter and half wave plate.
 - b) Discuss about construction and working of Ruby laser. [5+5]
- 6.a) Derive an expression for acceptance angle and numerical aperture.
 - b) Discuss about transmission of light in step index and graded index fibers. [5+5]
- OR**
- 7.a) Discuss about construction and principle of optical fiber with the help of neat diagram.
 - b) Describe various types of losses in optical fibers. [5+5]

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8.a) Discuss about seven crystal systems and their corresponding Bravais lattice with the help of neat diagrams.

b) Discuss about HCP and diamond structures.

[5+5]

OR

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9.a) Explain salient features of Miller indices.

b) Derive an expression for inter planar spacing of orthogonal crystal system.

[5+5]

10.a) Give an account of point defects.

b) Derive an expression for the concentration of Schottky defects at a given temperature.

[5+5]

OR

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11.a) Discuss about powder method of X-ray diffraction with the help of neat diagram.

b) Explain the significance of Burger's vector.

[5+5]

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Code No: 111AD

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

ENGINEERING PHYSICS

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, AME, MIE, PTM, AGE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) What is Ionic Bond? [2]
- b) What is Hydrogen Bond? [3]
- c) Write two important properties of Matter Waves. [2]
- d) What is the main difference between Micro Canonical and Canonical Ensembles? [3]
- e) What is Polarizability? [2]
- f) What is the Magnetization? [3]
- g) Write applications of lasers. [2]
- h) Define Numerical Aperture. [3]
- i) Explain about top down approach for synthesis of nanomaterials. [2]
- j) What is Sabine's Formula? Explain. [3]

PART-B

(50 Marks)

- 2.a) What is packing fraction? Deduce packing factor for BCC structure.
 - b) Write notes on Frenkel and Schottky defects with diagrams. [5+5]
- OR**
- 3.a) Explain with suitable examples the covalent and metallic type of bondings in solids.
 - b) Write a note with neat diagram of Structure of Diamond. [5+5]
- 4.a) Derive an expression for Schrödinger's Time Independent Wave Equation.
 - b) Describe Concept of Effective Mass of an Electron. [5+5]
- OR**
- 5.a) Write an essay on Davisson and Germer's Experiment.
 - b) Explain Origin of Energy Band Formation in Solids. [5+5]

- 26 26 26 26 26 26 26 2
- 6.a) Derive an expression for electronic polarizability in terms of the radius of the atom.
b) Write short notes on piezoelectricity. [5+5]

OR

- 26 26 26 26 26 26 26 2
- 7.a) Write notes on Type-I and Type-II Superconductors along with the applications of Superconductors.
b) Discuss about Meissner Effect. [5+5]

- 8.a) Discuss about Diffraction grating experiment with the help of diagram.
b) Write short notes on Nicol prism. [5+5]

OR

- 26 26 26 26 26 26 26 2
- 9.a) Write an essay on construction and working of Helium-Neon Laser.
b) What is the importance of the Attenuation in Optical Fibers? [5+5]

- 10.a) Write an essay on Chemical Vapour Deposition.
b) Discuss about Solar cell, LED and Photo Diodes. [5+5]

OR

- 26 26 26 26 26 26 26 2
- 11.a) What are the factors affecting the architectural acoustics and suggest their remedies.
b) Write notes on Quantum Confinement. [5+5]

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Code No: 51002

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

MATHEMATICS-I

(Common to CE, EEE, ME, ECE, CSE, CHEM, EIE, BME, IT, AE, BT, AME, MIE, MSNT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Discuss the nature of the convergence of the series $\sum \left(\frac{n}{n+1}\right)^n \cdot x^n$

- b) Test the convergence and absolute convergence of the series [7+8]

$$\frac{1}{2} - \frac{2}{5} + \frac{3}{10} - \frac{4}{17} + \dots + \frac{(-1)^{n+1} n}{n^2 + 1} + \dots \text{ to } \infty$$

- 2.a) Define functional dependency of functions. Determine whether the following functions are functionally dependent or not. If functionally dependent find the relation among them.

$$u = x + y - z; v = x - y + z; w = x^2 + y^2 + z^2 - 2xz$$

- b) Divide 24 into three parts such that the continued product of the first, square of the second and cube of the third may be maximum. [8+7]

- 3.a) Trace the curve $r = a \cos 2\theta$.

- b) If ρ_1, ρ_2 be the radii of curvature at the extremities of any chord through the pole of the cardioid $r = a(1 + \cos \theta)$. Show that $\rho_1^2 + \rho_2^2 = \frac{16a^2}{9}$. [7+8]

- 4.a) Evaluate the double integral $\int_0^a \int_0^{\sqrt{a^2 - x^2}} y \sqrt{x^2 + y^2} dx dy$ by transforming into polar coordinates.

- b) Find the volume of the portion of the sphere $x^2 + y^2 + z^2 = 4$ lying inside the cylinder $x^2 + y^2 = 2x$. [7+8]

- 5.a) Solve the differential equation $\frac{dy}{dx}(x^2 y^3 + xy) = 1$.

- b) Bacteria in a culture grow exponentially so that the initial number has doubled in 3 hours. How many times the initial number will be present after 9 hours? [7+8]

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

- b) Apply the method of variation of parameters to solve $\frac{d^2 y}{dx^2} + y = \operatorname{cosec} x$. [8+7]

7.a) Apply Convolution theorem to evaluate $L^{-1}\left\{\frac{s^2}{(s^2+4)(s^2+25)}\right\}$.

b) Solve the differential equation $\frac{d^2x}{dt^2} + 9x = \sin t$ using Laplace transform given that $x(0) = 1, x\left(\frac{\pi}{2}\right) = 1$. [7+8]

8.a) Find the directional derivative of $2xy + z^2$ at $(1, -1, 3)$ in the direction of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$.

b) If $\vec{F} = 3xy\hat{i} - y^2\hat{j}$ then evaluate $\int_C \vec{F} \cdot d\vec{r}$ where C is the curve $y = 2x^2$ in xy- plane from $(0, 0)$ to $(1, 2)$. [7+8]

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