CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024

Course Name: ENGINEERING CHEMISTRY

(Common for CE, ME, CSC, CSM, CSD & AIM)

Date: 15.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. How Lithium ion battery works?   1 M
2. What is cathodic protection in the context of corrosion?   1 M
3. Draw the structure of Nylon-6, 6.   1 M
4. What are the monomers of Thiokol Rubber?   1 M
5. Define calorific value.   1 M
6. Explain the composition of CNG & LPG.   1 M
7. What are the problems caused by the hard water usage in boilers?   1 M
8. Differentiate between sludge and scale.   1 M
9. What is the composition of glass?   1 M
10. How do you increase the viscosity index of lubricating oils?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). What are secondary batteries? Give the construction and working of Lithium ion battery.   10M

OR

11. B). Explain the mechanism involved in rusting of iron by electrochemical theory.   10M

12. A). Give the synthesis, properties and applications of Bakelite and Buna-S.   10M

OR

12. B). What are composite materials? Discuss some important types of fibre-reinforced composites and its applications.   10M

13. A). Explain the proximate and ultimate analysis of coal to ascertain its quality.   10M

OR

13. B). Explain the synthesis of petrol by Fisher- Tropsch Process.   10M

14. A). What is desalination of water? Explain with principle the reverse osmosis and electro dialysis techniques.   10M

OR

14. B). i) 100 mL of hard water sample when titrated against 0.0132M EDTA consumed 24.8 mL and the same quantity of water sample after boiling consumed 18.5 mL of 0.0132M EDTA. Calculate the total, permanent and temporary hardness of water sample.   5M
ii) Explain the caustic embrittlement of boilers.   5M

15. A). Write the chemical composition of Portland cement and explain the setting and hardening of Portland cement with chemical reactions.   10M

OR

15. B). i) Define lubricant. What are the functions and good qualities of a lubricant?   5M
ii) Write a brief note on flash and fire point.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: APPLIED PHYSICS
(Common for EEE, ECE, CSE & IT)

Date: 15.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. What is Planck's Radiation Law?   1 M
2. List the merits of classical free electron theory.   1 M
3. Define Fermi Level.   1 M
4. Define direct band gap semiconductors.   1 M
5. Define meta stable state and population inversion.   1 M
6. Write the conditions for total internal reflection.   1 M
7. Define ferroelectricity.   1 M
8. What is Magnetostriction?   1 M
9. How conductivity varies in liquid and solid electrolytes?   1 M
10. What are the fabrication techniques in top-down approach?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Obtain the energy and wave function of a particle in one dimensional potential box.   7M
        ii) Calculate the energy difference between the ground state and first exited state for an   3M
        electron in a box of length 1.0 A°.

OR

11. B). Using Kronig-Penney model, show the energy spectrum of electron consisting of a   10M
        number of allowed and forbidden bands.

12. A). Describe construction and working characteristics of Zener diode? Mention few   10M
        applications of Zener diode?

OR

12. B). Explain the construction and principle of PIN diode.   10M

13. A). Discuss the essential requirements and mechanism to produce laser from CO_2 laser.   10M

OR

13. B). Derive expressions for the acceptance angle and numerical aperture of an optical fiber.   10M

(P.T.O..)

14. A).   i) Explain different types of polarization of a dielectric material.   3M
           ii) Derive the Clausius Mossotti's equation.   7M

OR

14. B).   Explain soft and Hard magnetic materials? Write the difference between them.   10M

15. A).   i) Explain superionic conductors.   4M
         ii) Discuss the potential applications of superionic conductors in various fields, such as   6M
         energy storage and fuel cells.

OR

15. B).   How SEM is used to characterize the size of nanoparticles?   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: C PROGRAMMING AND DATA STRUCTURES
(Common for CE & ME)

Date: 17.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1.	What is Token?	1 M
2.	Define special operator in C.	1 M
3.	What is an break statement?	1 M
4.	Define multi-dimensional array.	1 M
5.	Define return value in C.	1 M
6.	What is lifetime of global variable?	1 M
7.	Define ADT.	1 M
8.	Define Queue.	1 M
9.	What is sorting?	1 M
10.	What is Time complexity of Linear search?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Discuss all data types in C.   10M

OR

11. B). i) Discuss the expressions in C.   6M
ii) Explain the evaluation of the following expression: 4M
Result=111*333/555+777.

12. A). Apply for loop to print a "Hello" for 10 times. Discuss for loop with syntax.   10M

OR

12. B). Differentiate while, do-while with neat flow chart and example.   10M

13. A). Explain the followings with example: 10M
i) Function definition
ii) Function declaration
iii) Function calls

OR

13. B). Define strings. Explain any five string handling functions.   10M

14. A). Discuss singly linked list and its operations with examples.   10M

OR

14. B). Explain STACK and its operations with neat diagrams.   10M

15. A). Explain Binary search technique with suitable example.   10M

OR

15. B). Explain Selection sort technique and its operations with suitable example.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: BASIC ELECTRICAL ENGINEERING
(Common for CSC, CSM, CSD & AIM)

Date: 17.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. State the Kirchoff's Voltage law.   1 M
2. Define Thevenin's theorem.   1 M
3. What are the advantages of 3 phase circuits over single phase circuits?   1 M
4. What are the three types of power in AC circuits?   1 M
5. What is the function of a transformer?   1 M
6. Define voltage regulation of a Transformer.   1 M
7. What is an electric Generator?   1 M
8. Write the emf equation for d.c generator?   1 M
9. Define necessity of Electrical Earthing.   1 M
10. What is the difference between wire and cable?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Three resistors 30 Ω, 25 Ω, 45 Ω are connected in series across 200V. Calculate (i) Total   10M
resistance (ii) Current (iii) Potential difference across each element?

OR

11. B). Derive the transient response of an RC circuit with DC excitation.   10M

12. A). Derive the expression for RMS value and Average value of sine signal.   10M

OR

12. B). A three phase balance delta connected load of (4+j8) Ω is connected across a 400V, 3¢   10M
balanced supply. Determine the phase currents and line currents. And also power drawn
by the load. Assume RYB phase sequence.

13. A). Explain about auto transformer and discuss in detail about the difference between Auto   10M
transformer and Ordinary transformer.

OR

13. B). Describe the various three phase transformer connections with neat diagram.   10M

14. A). Explain the construction and working principle of Generator with neat diagram.   10M

OR

14. B). Explain the construction and working principle of 3 phase induction motor with neat   10M
diagram.

15. A). Explain the different types of earthing with neat diagram.   10M

OR

15. B). Explain Construction and working principle of MCB.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: ORDINARY DIFFERENTIAL EQUATIONS & VECTOR CALCULUS
(Common for CE, EEE, ME, ECE, CSE, IT, CSC, CSM, CSD & AIM)

Date: 20.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Define exact differential equation.   1 M
2. State the Newton's law of cooling.   1 M
3. Solve $(D^2 + 1)y = 0$ 1 M
4. Find P. I of $(D^2 + 1)y = \cosh x$ 1 M
5. Define Dirac delta function.   1 M
6. Find the Laplace transform of t^3 1 M
7. Define irrotational vector.   1 M
8. Find $div(\bar{r})$, $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ 1 M
9. State Gauss divergence theorem.   1 M
10. Find work the work done by a force $y\bar{i} + x\bar{j}$ which displaces a particle from origin to a point($\bar{i} + \bar{j}$).   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Solve $\left(1 + e^{\frac{x}{y}}\right) dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right) dy = 0$ 5M

ii) If 30% of radioactive substance disappears in 10 days, how long will it take for 90% of it to disappear.   5M

OR

11. B). Show that self-orthogonal $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1, \lambda \ is \ parameter$ 10M

12. A). Solve $(D^2 + 3D + 2)y = e^{e^x}$ 10M

OR

12. B). Solve $(D^2 + 1)y = e^{-x} + x^3 + e^x Sinx$ 10M

13. A). Using Laplace Transform, Solve $\frac{d^2x}{dt^2} + 9x = \sin t$, given that $x(0) = 1, x\left(\frac{\pi}{2}\right) = 1$ 10M

OR

13. B). Using Convolution theorem, find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$ 10M

14. A). i) Find the directional derivative of $f = xy + yz + zx$ in the direction of vector $\bar{i} + 2\bar{j} + 2\bar{k}$ at the point $(1, 2, 0)$.   5M

ii) Prove that $\nabla(r^n) = nr^{n-2}\bar{r}$ 5M

OR

14. B). Prove that $div\ (grad\ r^m) = m(m+1)r^{m-2}$

10M

15. A). Verify Green's theorem in plane for $\oint(3x^2 - 8y^2)\ dx + (4y - 6xy)\ dy$ where C is the region bounded by $x = 0, y = 0$ and $x + y = 1$.

10M

OR

15. B). Apply Stokes theorem, to evaluate $\oint_C (y\ dx + z\ dy + x\ dz)$ where C is the curve of intersection of the sphere $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.

10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: ENGINEERING GRAPHICS
(Common for CE & ME)

Date: 22.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. What will be the eccentricity in case of (a) Ellipse (b) Parabola (c) Hyperbola?   1 M
2. List the applications of different curves.   1 M
3. Classify the different types of Projections?   1 M
4. How to project a straight line?   1 M
5. Classify the different types of solids?   1 M
6. What is solid of revolution?   1 M
7. How can you get true shape of a section?   1 M
8. What is meant by Development of solids?   1 M
9. What is the isometric projection of sphere?   1 M
10. What is an isometric projection?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Construct a parabola when the distance between the focus and directrix is 30mm. Also draw the tangent and normal to any point on the curve.   10M

OR

11. B). Construct a cycloid given the radius of the generating circle is 30mm. also draw a tangent and normal at any point on the cycloid.   10M

12. A). One end P of a line PQ, 55mm long is 35mm in front of VP and 25mm above HP. The line is inclined at 40° to HP and 30° to VP. Draw the projections.   10M

OR

12. B). A rectangular plate of size 60mm x 30mm has one of its shorter edges in VP and inclined at 40° to HP. Draw its top view if its front view is a square of side 30mm.   10M

13. A). A hexagonal pyramid of base side 30mm, axis height 60mm is resting on HP on one of its base corners with its axis inclined at 40° to HP and parallel to VP. Draw its projections when the base sides containing the resting corners are equally inclined to HP.   10M

OR

13. B). A cylinder of base diameter 50mm and axis height 65mm is resting on HP on a point on the circumference of the base with its axis inclined at 50° to HP and parallel to VP. Draw its projections.   10M

(P.T.O..)

14. A). A hexagonal prism of base 30mm and axis 60mm rests on its base on HP with its axis 10M perpendicular to HP and one of the base edge parallel to VP. The solid is cut by a plane which is perpendicular to VP, inclined at 40° to HP and bisecting the axis of the prism. Draw the front view, sectional top view and true shape of the section.

OR

14. B). A cone of base diameter 40mm and altitude 60mm rests on its base on the HP. It is cut by 10M a plane inclined at 40° to HP and passes through a point on axis which is 40mm above HP. Develop a lateral surface of the lower portion of the cone.

15. A). A cylinder of base diameter 40mm and height 60mm rests on its base on HP. It is cut by a 10M plane perpendicular to VP and inclined at 45° to HP. The cutting plane meets the axis at a distance of 15mm from the top surface. Draw the isometric view of the truncated cylinder.

OR

15. B). Draw to scale 1:1 the front view, top view and side view of the given figure. 10M
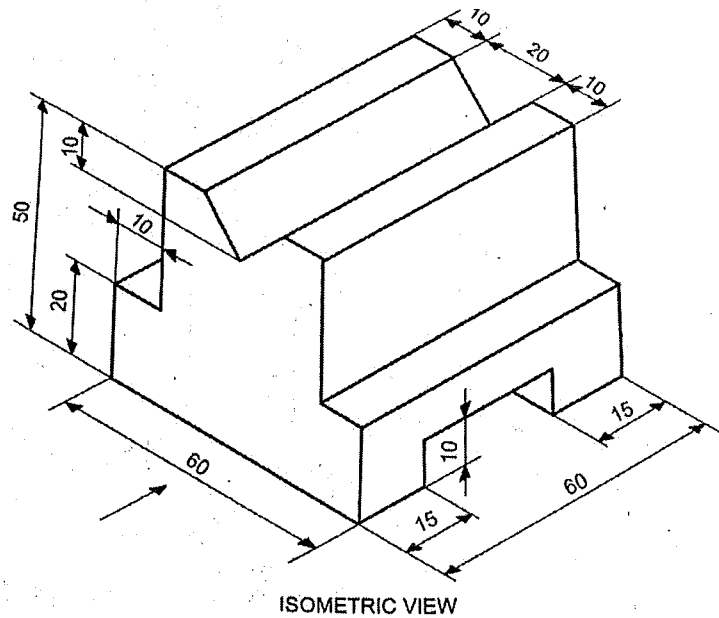
ISOMETRIC VIEW

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: ANALOG ELECTRONIC CIRCUITS
(Electrical & Electronics Engineering)

Date: 22.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Draw the P-N junction diode VI characteristics   1 M
2. Mention the applications of Transistor.   1 M
3. Compare BJT with FET   1 M
4. Draw the Circuit symbol of Enhancement Type p-channel MOSFET   1 M
5. What are the applications of class C tuned amplifier   1 M
6. Compare class A and class B amplifier.   1 M
7. List the Feedback amplifiers.   1 M
8. State the Barkhausen criterion for an oscillator.   1 M
9. Define Input offset current?   1 M
10. Draw the Operational amplifier as Inverting Amplifier.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Draw the circuit diagram of half wave rectifier and explain its operation with the help of waveforms.   10M

OR

11. B). Discuss the Input and Output characteristics of a BJT in CE Configuration. Indicate the regions of operations in the output characteristics.   10M

12. A). Draw the circuit diagram for Common Source configuration of n-channel JFET and discuss the Drain and Transfer Characteristics.   10M

OR

12. B). Discuss the operation and characteristics of n-channel depletion type MOSFET with diagram.   10M

13. A). Explain the working of class-A Amplifier with the help of block diagram.   10M

OR

13. B). Draw the circuit diagram of RC coupled amplifier. Explain the operation and its frequency response.   10M

14. A). Explain the principle of operation of the Wien bridge oscillator.   10M

OR

14. B). Draw the block diagram of an amplifier with feedback and explain its concept.   10M

15. A). Draw a neat circuit of a differentiator circuit. Explain the functioning with the input-output Wave forms.   10M

OR

15. B). Discuss the operation of inverting summing amplifier.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: BASIC ELECTRONIC CIRCUITS
(Electronics & Communication Engineering)

Date: 22.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Define Static resistance.   1 M
2. What is transition capacitance?   1 M
3. Define rectifier.   1 M
4. What is the use of clipper circuits?   1 M
5. Define Transistor.   1 M
6. What is the purpose of bias compensation?   1 M
7. Why FET is called the voltage-controlled device?   1 M
8. What is the use of FET biasing techniques?   1 M
9. What is the advantage of solar cells?   1 M
10. What are the applications of Zener diode?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain static and dynamic resistance of diode with relevant equations.   10M

OR

11. B). Explain how diode acts as switch with neat diagrams.   10M

12. A). Explain the operation of half wave rectifier with input and output wave forms. 10M

OR

12. B). Describe the operation of clipper circuit with neat diagrams.   10M

13. A). Discuss the input and output characteristics of BJT in common base configuration. 10M

OR

13. B). Explain the concept of fixed biasing with relevant equations and sketches.   10M

14. A). Describe the volt-Ampere characteristic of FET with neat diagrams.   10M

OR

14. B). Explain the following.   10M
        i)   Compare BJT and FET.
        ii)   FET as Voltage variable resistor.

15. A). Describe the characteristics of Zener diode and discuss how Zener diode acts as voltage   10M
        regulator.

OR

15. B). Explain the construction and operation of Tunnel diode and UJT.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: DATA STRUCTURES
(Common for CSE, IT, CSC, CSM, CSD & AIM)

Date: 22.02.2024 FN	Time: 3 hours	Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1.	Difference between linear and nonlinear data structure.	1 M
2.	Define the double linked list structure.	1 M
3.	What is Dictionary?	1 M
4.	What do you mean by collision in hashing?	1 M
5.	Define Binary search Tree.	1 M
6.	List the properties of Red Black Tree.	1 M
7.	Define path in a graph?	1 M
8.	What are the advantages of heap sort	1 M
9.	Define the Pattern matching.	1 M
10.	Write the difference between standard trie and compressed trie.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Explain in detail about the various operations on queues with examples.	10M

OR

11. B).	With an example explain how an infix expression is converted to a postfix expression.	10M
12. A).	What do you mean by a hash table and a hash function? Explain the following hash functions with an example (i). Division method (ii). Mid square	10M

OR

12. B).	Explain Collision Resolution Techniques in Hashing.	10M
13. A).	What is an AVL tree? Explain various rotations of AVL trees maintaining balance factor while insertion and deletion takes place.	10M

OR

13. B).	i) Define Red - Black trees. Write the procedure to insert an element in to Red – Black trees.	5M
	ii) Write a short note on height of B-trees	5M
14. A).	Explain about Merge sort with an example.	10M

OR

14. B).	How is a graph traversed using depth first search? Explain with example?	10M
15. A).	"A compressed trie is an advanced version of the standard trie." Support or oppose this statement with necessary explanation.	10M

OR

15. B).	Explain about the Brute force algorithm with an example.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: BUILDING MATERIALS, CONSTRUCTION AND PLANNING
(Civil Engineering)

Date: 24.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Describe various characteristics of good building stones.   1 M
2. Define Seasoning of timber.   1 M
3. What are the ingredients of cement.   1 M
4. List the lab tests of cement.   1 M
5. What are different types of floors.   1 M
6. State the characteristics of acoustics.   1 M
7. What are different types of cladding.   1 M
8. Describe different types of paints.   1 M
9. List the various principles in building planning.   1 M
10. Write about set back and Road Margin.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Which tests are required for determining the suitability of bricks for construction works?   10M
Describe the tests briefly.

OR

11. B). Draw the cross -section of a good timber and explain its various components.   10M

12. A). Write in detail about the mineral and chemical admixtures.   10M

OR

12. B). What are bouge's compounds? Explain their role in setting and hardening process of   10M
Portland cement.

13. A). Define the following terms: i) Soil pipe ii) Waste pipe iii) Vent pipe iv) Siphonage   10M
v) Sewage

OR

13. B). Draw a neat sketch of a typical Arch. Indicate various features of the Arch.   10M

14. A). Explain with sketches, different types of Composite masonry used.   10M

OR

14. B). Explain different types of finishes like plastering. Pointing, painting, and cladding.   10M

15. A). Explain in detail about Principles of building planning.   10M

OR

15. B). What are the various factors to be considered in selecting a site for residential building?   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations February-2024
Course Name: ENGINEERING MATERIALS
(Mechanical Engineering)

Date: 24.02.2024 FN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1.	What is an Ashby chart?	1 M
2.	What is ASTM?	1 M
3.	What are two types of metal alloys?	1 M
4.	Where Aluminium alloy is used?	1 M
5.	List the types of reinforcement in composite materials?	1 M
6.	What are the advantages of injection moulding process?	1 M
7.	Whether diamond and graphite same or different?	1 M
8.	Define elastomers.	1 M
9.	What is a semiconductor nanoparticle?	1 M
10.	Why copper nanoparticles are used?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). What are the key mechanical properties of metals, and why are they important for engineering applications of metals?   **10M**

OR

11. B). What is the fundamental difference between stress and strain in materials, and how are they related in describing a material's behavior under load?   **10M**

12. A). Describe the various types of steels. What are the distinctive characteristics and industrial applications of steels?   **10M**

OR

12. B). Describe the compositions, properties and applications of Aluminum.   **10M**

13. A). How does the choice of fibers and resin systems impact the final properties of the composite?   **10M**

OR

13. B). Describe the key steps involved in the layup process for fabricating fiber-reinforced composites.   **10M**

14. A). What are the properties and application of ceramics? Discuss briefly.   **10M**

OR

14. B). What are the characteristics of polymers and explain the applications of polymers?   **10M**

15. A). Describe characteristics and applications of titanium dioxide nanoparticles.   **10M**

OR

15. B). What are the uses of biomaterials in engineering? Discuss briefly.   **10M**

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