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R18

Course Code: A30321

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **MATERIALS ENGINEERING**

(Mechanical Engineering)

Date: 08.08.2023 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Recall Hooke's law. Enlist the conditions under which it is valid. 2 M
2. Reproduce (001), (110) and (111) crystallographic planes. 2 M
3. State Tresca's Theory. Enlist its applications. 2 M
4. Reproduce Modified Goodman diagram Curve. Enlist the salient points on the curve. 2 M
5. Determine the degrees of freedom of a system of two components when the number of phases is one, two, three, and four? 2 M
6. State Lever Rule. 2 M
7. Recall Spheroidising with sketch. 2 M
8. Enlist the basic requirements for hardening of steels. 2 M
9. Recall applications of Maraging steel. 2 M
10. Classify Composite materials by a Tree diagram. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Discuss the role of slip in plastic deformation. 3M
 ii) Enlist and explain Point and Interstitial defects. 7M

OR

11. B). i) Explain the phenomena: Deformation by Twinning. Enlist the conditions that favor the phenomena in alloys. 5M
 ii) Is it possible for two screw dislocations of opposite sign to annihilate (destroy) each other? Explain your answer. 5M

12. A). i) Recall factors that affect fatigue life. 4M
 ii) Explain various methods of protection against fracture. 6M

OR

12. B). i) Reproduce Modified Goodman diagram. 3M
 ii) The half length of cracks in a steel is 2m. Taking $Y=200 \text{ GN m}^{-2}$, estimate the brittle fracture strength at low temperatures, if the true surface energy is 1.5 J m^{-2} . The actual fracture strength is found to be 1200 MN m^{-2} . Explain the difference, if any, between this and your result. 7M

(P.T.O..)

13. A). In the binary phase diagram (Fig.1), mark the various phase fields after reproducing the same diagram on the answer sheet. Give all the invariant reactions that occur, stating their names. 10M

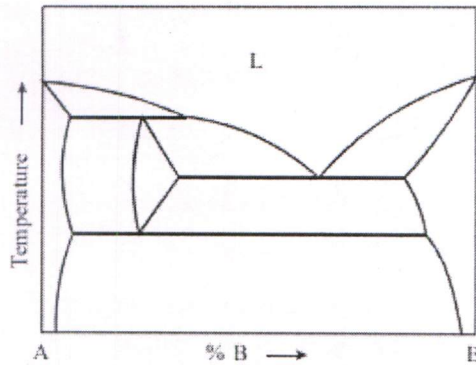


Fig.1 Binary Phase diagram of A and B

OR

13. B). Reproduce the microstructures of (i) Ledeburite (ii) Austenite (iii) Ferrite (iv) Cementite (v) Cast Iron. 10M

14. A). i) Distinguish between Austempering and Martempering 5M
 ii) Distinguish between Hardness and Hardenability. Explain Jominy Test. 5M

OR

14. B). Explain the process principle of Induction hardening with neat sketches. Enlist its applications. 10M

15. A). Enlist various cast irons, its compositions, properties and applications. 10M

OR

15. B). i) Enlist any 5 applications of Titanium alloys. 5M
 ii) Sketch the microstructures of Malleable Iron (fast cooling) and Malleable Iron (Slow cooling). 5M

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Course Code: A30323

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **THERMODYNAMICS****(Mechanical Engineering)**

Date: 10.08.2023 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Define (i) Thermodynamic System (ii) Thermodynamic Equilibrium. 2 M
2. Distinguish point and path functions. 2 M
3. Define First Law of Thermodynamics. 2 M
4. Explain Joules Experiment in brief. 2 M
5. What is the relation between CoP of Heat pump and Refrigerator? 2 M
6. Define Second Law of Thermodynamics. 2 M
7. Explain Throttling Process. 2 M
8. Define Dryness Fraction. 2 M
9. Explain the term thermal efficiency. 2 M
10. Show Dual Cycle on T-S Diagram. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Explain in detail about quasi-static process 5M
ii) If the reading of a pressure gauge fitted on a vessel is 25 bar and an atmospheric pressure is 1 bar, then find the value of absolute pressure. 5M

OR

11. B). i) What is irreversibility? Explain of Causes with examples. 5M
ii) Identify type of systems: 5M

1	Closed System	A	Thermos Flask
2	Open System	B	Nozzle
3	Isolated System	C	Power Plant Cycle

12. A). i) Explain Similarities and Dissimilarities between Heat and Work. 5M
ii) A domestic refrigerator is loaded with the fresh food and the door is closed. During a certain period, it consumes 1.25 KWh of electrical energy in cooling the food and the internal energy of the system decreases by 4500 KJ. Determine the magnitude and the net heat transfer for the system. The refrigerator and its contents may be considered as a system. 5M

OR

12. B). i) Compare Open System and Closed System. 5M
ii) 0.2 m³ of an ideal gas at a pressure of 2 MPa & 600K is expanded isothermally to five times the initial volume. It is further cooled to 300K at constant volume and then compressed back polytropically to its initial state. Interpret the network done and Net heat transfer during the cycle by drawing a neat P-V diagram. 5M

(P.T.O.)

13. A). A heat engine receives half of its heat supply at 1000 K and half at 500 K while rejecting heat to a sink at 300 K. Estimate the maximum thermal efficiency of the heat engine? 10M

OR

13. B). Estimate the decrease in available energy when 25 kg of water at 95°C mix with 35 kg of water at 35°C, the pressure being taken as constant and the temperature of the surroundings being 15°C. 10M

14. A). When air is compressed, the enthalpy has increased from 100 to 200 kJ/kg. Heat lost during this compression is 50 kJ/kg. Neglecting kinetic and potential energies, evaluate the power required, if the mass flow rate is 2 kg/s. 10M

OR

14. B). Evaluate difference between heat capacities using Maxwell's relations. 10M

15. A). In an air standard Diesel cycle, the compression ratio is 16, and at the beginning of isentropic compression, the temperature is 15°C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure is 1480°C. Determine: (i) Cut-off ratio (ii) Heat supplied per kg of air (iii) cycle efficiency (iv) Mean effective pressure. 10M

OR

15. B). An engine working an Otto cycle is supplied with air at 0.1 MPa, 35°C. The compression ratio is 8. Heat supplied is 2100 KJ/KG. Determine: (i) maximum pressure and temperature of the cycle (ii) cycle efficiency (iii) mean effective pressure. 10M

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Course Code: A30181



CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: MECHANICS OF SOLIDS

(Mechanical Engineering)

Date: 12.08.2023 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

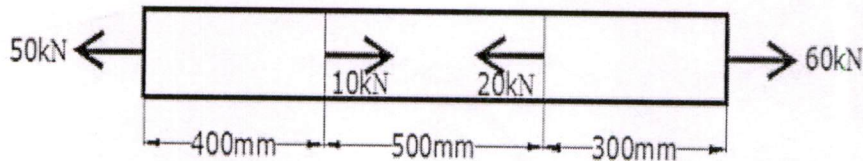
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|----------------------------------------------------------------------------------------|-----|
| 1. State Hooke's law. | 2 M |
| 2. Define the term stress and strain. | 2 M |
| 3. List out different types of beams with neat sketches. | 2 M |
| 4. Write a short note on neutral axis. | 2 M |
| 5. Write a short note on Maxwell reciprocal theorem. | 2 M |
| 6. Discuss about the salient features of Double integration method. | 2 M |
| 7. Write a short note on effect of torsion on any member. | 2 M |
| 8. Discuss about the concept of stresses in helical springs. | 2 M |
| 9. Explain the concept of axial stress in cylinders. | 2 M |
| 10. Discuss about the deformations in spherical shells subjected to internal pressure. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). What are elastic constants? Derive the relation between E, K and G. 10M
- OR**
- 11.B). Find the maximum stress and total elongation of a bar subjected to loads shown in fig. 10M
The bar has a diameter 30mm and E for the bar 105GPa.



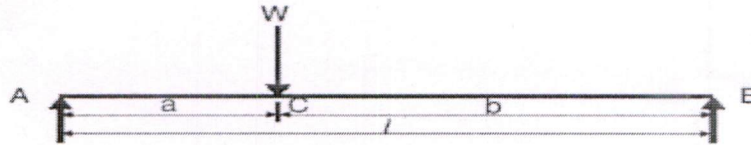
- 12.A). Draw the S.F. and B.M. diagrams for a simply supported beam of length L carrying a point load W at its middle point. 10M
- OR**
- 12.B). A horizontal beam AB of 10 m long is simply supported at its ends A and B. It carries a point load of 2.5 kN at 3 m from A, another point load of 2.5 kN at 7 m from point A and a uniformly distributed load of 1 kN/m between the two point loads. Draw the shear force and bending moment diagrams. 10M

(P.T.O.)

13. A). For a cantilever beam with uniformly distributed load over entire length, determine the equation for deflection curve using double integration method. Determine the maximum deflection of the beam also. 10M

OR

13. B). Determine the equation of the deflection curve for a simply supported beam as shown in figure. Use double integration method. Also, determine the maximum deflection and the angles of rotation at the supports. 10M



14. A). What are the assumptions made in the derivation of torsion equation and derive the torsion formula? 10M

OR

14. B). A hollow shaft and a solid shaft constructed of the same material have the same length and the same outside radius r . The inside radius of the hollow shaft is $0.6r$. Assuming that both shafts are subjected to the same torque, compare the maximum shear stresses, the angles of rotation. 10M

15. A). A thin cylindrical vessel of 2 m diameter and 4 m length contains a particular gas at a pressure of 1.65 N/mm^2 . If the permissible tensile stress of the material of the shell is 150 N/mm^2 , find the minimum thickness required. 10M

OR

15. B). The internal and external diameter of a thick hollow cylinder is 80 mm and 120 mm respectively. It is subjected to an external pressure of 40 N/mm^2 and an internal pressure of 120 N/mm^2 . Calculate the axial and hoop stresses at the mean radius. 10M

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Course Code: A30324



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: MACHINE DRAWING

(Mechanical Engineering)

Date: 17.08.2023 AN

Time: 3 hours

Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A

Answer any TWO questions
Each question carries FIVE marks.

2x5=10M

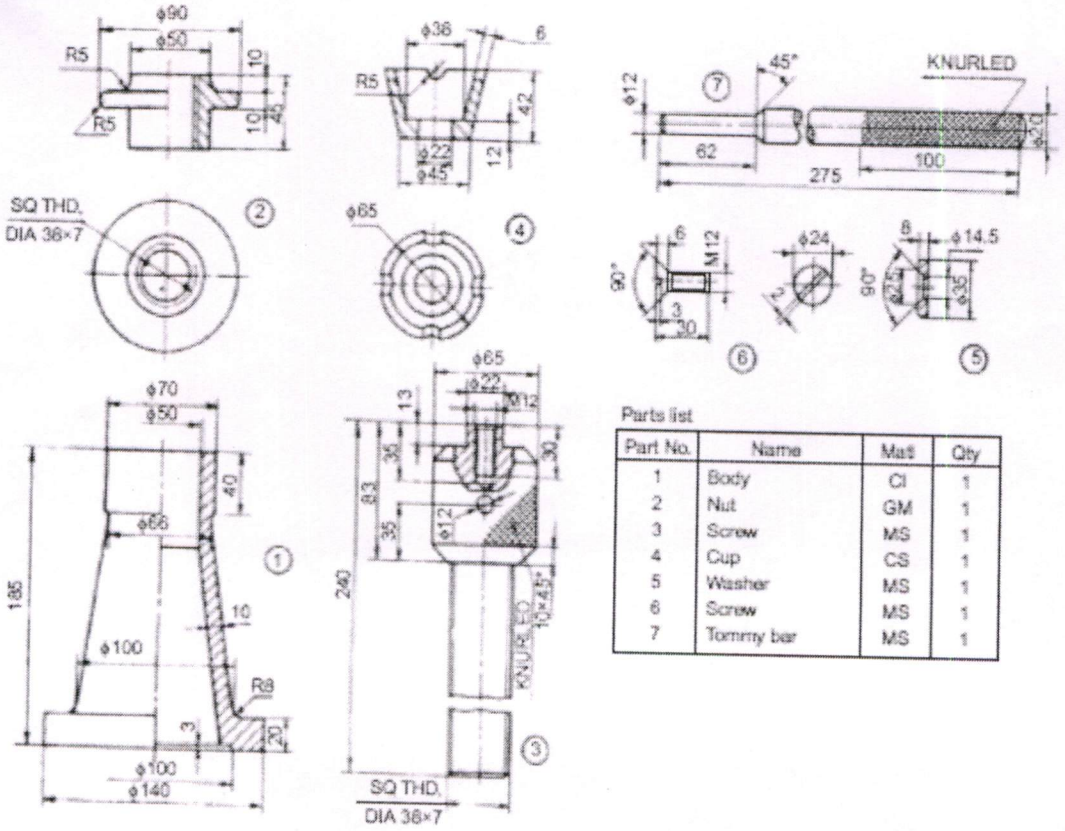
1. Sketch the following conventional materials: a) Bronze b) Cast Iron and c) Concrete. 5 M
2. Sketch the following: a) Any three types of set screws b) Feather key and c) Woodruff key. 5 M
3. Sketch neatly; giving proportionate dimensions the eye foundation bolts of diameter 25 mm. 5 M
4. Draw the half sectional front view and side view of sleeve coupling to connect two shafts each of diameter of 40 mm. 5 M
5. Draw the sectional front view and top view of single riveted lap joint with plate thickness 20 mm. 5 M

PART-B

Answer the following question. Question carry FIFTY marks.

1x50=50M

6. Details of Screw jack are given in Figure. Draw the following views of the Screw jack with all the parts assembled together. (All dimensions are in mm)
 - a) Half sectional front view
 - b) Top view35 M
15 M



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Course Code: A30226



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

(Common for CE & ME)

Date: 19.08.2023 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

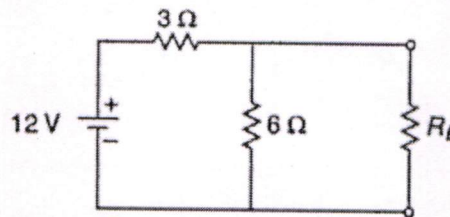
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|-------------------------------------------------------------------------------|-----|
| 1. State Kirchoff's voltage and current laws. | 2 M |
| 2. Distinguish between moving coil and moving iron instruments. | 2 M |
| 3. What are basic parts of a DC machine? | 2 M |
| 4. What is the back emf in DC motor? | 2 M |
| 5. Enumerate the various losses in a transformer. | 2 M |
| 6. How synchronous impedance is calculated from OCC and SCC? | 2 M |
| 7. Draw the volt-ampere characteristics of P-N junction silicon diode. | 2 M |
| 8. What is a Bi-polar Junction Transistor (BJT)? How are its terminals named? | 2 M |
| 9. Name the main components of a CRO. | 2 M |
| 10. List the applications of CRO. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). For the electrical network shown in figure. Find the value of load resistance R_L for which source will supply maximum power to the load. Also find the maximum power. 10M



OR

- | | |
|---------------------------------------------------------------------------------|-----|
| 11. B). State Superposition theorem and explain it. | 10M |
| 12. A). Give the classification of DC generator and explain with neat diagrams. | 10M |
| OR | |
| 12. B). Derive the torque equation of DC motor. | 10M |
| 13. A). Discuss the principle of operation of three phase induction motor. | 10M |
| OR | |
| 13. B). Derive an expression for the emf induced in a transformer winding. | 10M |

(P.T.O.)

14. A). Explain the operation of half wave rectifier with neat sketch and derive the necessary expressions. 10M

OR

14. B). Draw the static V-I characteristics of SCR and mark latching current and holding current. 10M

15. A). Discuss about the electrostatic focusing deflection system of a CRO with necessary diagrams. 10M

OR

15. B). Describe the voltage, current and frequency measurements using CRO. 10M

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Course Code: A30531



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: PYTHON PROGRAMMING

(Common for CE, EEE, ME, ECE, CSE, IT, CSC & CSM)

Date: 22.08.2023 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Interpret the process of Reading input from the key board. 2 M
2. Distinguish between while and for loop. 2 M
3. Outline the idea of Definite Iteration. 2 M
4. What are Global Values and Global Constants? 2 M
5. Determine the need of Lists. 2 M
6. Classify the String Methods 2 M
7. Show the difference between Classes and Functions. 2 M
8. Discuss the Importance of Object Oriented programming. 2 M
9. Summarize the tkinter module. 2 M
10. Identify the need of widgets. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Discuss various operators available in python with example. 5M
ii) Compare different repetition Structures with examples 5M

OR

11. B). i) Illustrate the Principle of Types Conversion with an example. 5M
ii) Discuss about Nested Decision Structures with an example. 5M

12. A). i) Classify Process of Defining and calling of Void Function. 5M
ii) Outline the features of Value-Returning Functions. 5M

OR

12. B). i) Develop the steps to write a Python function that prints all factors of a given number. 5M
ii) What is the purpose to use Math Module? 5M

13. A). i) Demonstrate the comparison between lists, tuples, dictionaries and sets. 5M
ii) Illustrate a Python program that interchanges the first and last characters of a given string. 5M

OR

13. B). i) Discuss about recursive, and the Python function that recursively computes sum of elements in a list of lists. Sample Input: [1, 2, [3,4], [5,6]] Expected Result: 21 5M
ii) Show a Python program read a word and print the number of letters, vowels and percentage of vowels in the word using a dictionaries. 5M

(P.T.O..)

14. A). i) Evaluate the implementation of Object Oriented Programming. 5M
ii) Identify the Python program that overloads + operator, to add two objects of a class. 5M

OR

14. B). i) Can you Analyze inheritance class with suitable example in Python? 5M
ii) Show the working of method overriding works in Python? Explain with an example. 5M

15. A). i) Construct the Two Dimensional Shapes in Python. 5M
ii) Summarize the process of Display text with Label Widgets in Python. 5M

OR

15. B). i) Demonstrate the behavior of terminal based programs and GUI based Programs. 5M
ii) Determine the implementation of Button Widgets and info Dialog Boxes in Python. 5M
