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R18

Course Code: A30321



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: MATERIALS ENGINEERING

(Mechanical Engineering)

Date: 05.02.2024 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks.

10x2=20M

- | | |
|---|-----|
| 1. Describe the characteristics of ceramics. | 2 M |
| 2. State Hooke's Law. | 2 M |
| 3. Mention the importance of Von-mises stresses in failure theories. | 2 M |
| 4. Describe the applications of non-destructive testing of materials. | 2 M |
| 5. Differentiate eutectic and peritectic reactions. | 2 M |
| 6. What is an interstitial solid solution? | 2 M |
| 7. What is the purpose of normalizing? | 2 M |
| 8. Describe plasma hardening. | 2 M |
| 9. Enumerate types of cast iron. | 2 M |
| 10. Mention the applications of composite materials. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- | | |
|--|-----|
| 11.A). Define Tension, Compression, and Torsion. Mention industrial applications. What is the necessity of these tests on materials? | 10M |
| OR | |
| 11. B). What are imperfections in solids? How to resolve them? | 10M |
| 12. A). Illustrate Mohr's circle in a generalized condition of the stress situation. | 10M |
| OR | |
| 12. B). Deliberate Griffith's criterion. | 10M |
| 13. A). Illuminate various transformations in Fe-Fe ₃ C phase diagram with a neat Sketch. | 10M |
| OR | |
| 13. B). Derive the lever rule as applied to equilibrium diagrams. | 10M |
| 14. A). Exemplify the structural changes during the solidification of 0.4% carbon steel in the Fe-Fe ₃ C phase diagram. | 10M |
| OR | |
| 14. B). Define critical cooling rate. Enumerate and explain the procedure for drawing TTT diagram. | 10M |
| 15. A). How are nodular cast iron and malleable cast iron manufactured? | 10M |
| OR | |
| 15. B). Illuminate various types of Cast Iron with structure, properties and applications. | 10M |

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R18

Course Code: A30323



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: THERMODYNAMICS

(Mechanical Engineering)

Date: 07.02.2024 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks.

10x2=20M

- | | |
|---|-----|
| 1. Represent the reversible and irreversible process on a p-v plane. | 2 M |
| 2. Identify the different scales of temperature. | 2 M |
| 3. What is the difference between process and cycle? | 2 M |
| 4. Define internal energy and enthalpy. | 2 M |
| 5. Relate the nature of a cycle based on the Clausius inequality. | 2 M |
| 6. How the available and unavailable energy can be shown on T-S plane? | 2 M |
| 7. Why Maxwells relations are used? | 2 M |
| 8. Show the dryness fraction lines on T-S and h-s planes. | 2 M |
| 9. Mention the processes in Brayton cycle with the help of T-S diagram. | 2 M |
| 10. Which cycle is called mixed pressure cycle? | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Distinguish the intensive and extensive properties. 4M
 ii) The temperature t on a thermometric scale is defined in terms of a property K by the relation $t = a \ln K + b$, where a and b are constants. The values of K are found to be 1.83 and 6.78 at the ice point and the steam point, the temperatures of which are assigned the numbers 0°C and 100°C respectively. Determine the temperature corresponding to a reading of K equal to 2.42 on the thermometer. 6M

OR

11. B). i) Discuss the concept of continuum. 3M
 ii) A new scale N of temperature is divided in such a way that the freezing point of ice is 100°N and the boiling point is 400°N . What is the temperature reading on this new scale when the temperature is 150°C ? At what temperature both the Celsius and the new temperature scale reading would be the same? 7M
12. A). i) Differentiate between $W = \int p dv$ and $W = -\int v dp$. 3M
 ii) 1.5 kg of liquid having a constant specific heat of 2.5 kJ/kg K is stirred in a well-insulated chamber, causing the temperature rise by 15°C . Find the change in internal energy and work done during the process. 7M

OR

12. B). i) Develop the expression for work done in Isothermal process for a closed system. 5M
 ii) A gas turbine unit developing 15 MW power has at its inlet the enthalpy is 1100 kJ/kg and velocity is 50 m/s. At the exit enthalpy is 300 kJ/kg and velocity is 200 m/s. If the mass flow rate through the turbine is 20 kg/s, Calculate the rate of rejection of heat from the turbine. 5M

(P.T.O..)

13. A). i) State and prove Carnot's theorem. 5M
ii) Establish the relation among efficiency of heat engine, COP of heat pump and refrigerator with neat sketch 5M

OR

13. B). i) Demonstrate the principle of entropy increase. 5M
ii) Determine the change in entropy of 0.5 kg of air compressed polytropically from atmospheric pressure to 0.8 MPa and 800 K following index $n=1.2$, $C_v=0.71$ kJ/kgK 5M

14. A). i) What is the difference between gas constant and universal gas constant of mixture. 5M
ii) 3 kg of air initially at 25°C and 1 bar is compressed reversibly and adiabatically to 5 bar. Determine: a) Final temperature b) Change in internal energy c) Change in Enthalpy d) Change in entropy. 5M

OR

14. B). i) Illustrate the phase change process of pure substance using P-V, P-T diagram. 5M
ii) A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250°C . The mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy, and the internal energy. 5M

15. A). Obtain the expression for air standard efficiency of Diesel cycle. Show the processes on p-v and T-S planes. 10M

OR

15. B). A four-cylinder SI engine has a compression ratio of 8, each cylinder has a compression ratio of 8, and each cylinder has a maximum volume of 0.6 liter. At the beginning of the compression process, the air is at 98 kPa and 17°C and the maximum temperature in the cycle is 1800 K. Assume engine operates on ideal Otto cycle, determine, (i) amount of heat supplied per cylinder (ii) thermal efficiency. 10M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: MECHANICS OF SOLIDS

(Mechanical Engineering)

Date: 09.02.2024 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks.

10x2=20M

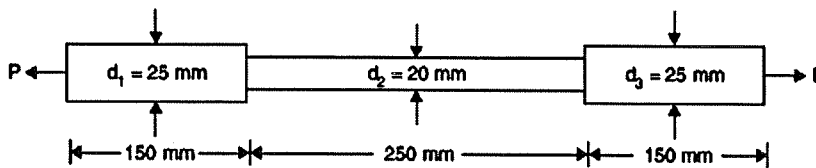
1. Define poisson ratio and lateral strain. 2 M
2. Write the expression for normal and shear stress on an oblique plane, when the member is subjected to a direct stress in one plane. 2 M
3. State any two assumptions of theory of simple bending. 2 M
4. Define section modulus. 2 M
5. Define the terms: deflection and slope. 2 M
6. What will be the maximum deflection of elastic curve for a simply supported beam length (l) subjected to a downward concentrated load W act at center? 2 M
7. Write the expression for maximum torque transmitted by hollow circular shaft. 2 M
8. Why hollow circular shafts are preferred when compared to solid circular shafts? 2 M
9. State the assumption made in lame's theorem for thick cylinder analysis. 2 M
10. A storage tank of internal diameter 280 mm is subjected to an internal pressure of 2.56 MPa. Find the thickness of the tank. If the hoop & longitudinal stress are 75 MPa and 45 MPa respectively 2 M

PART-B

Answer the following. Each question carries TEN Marks.

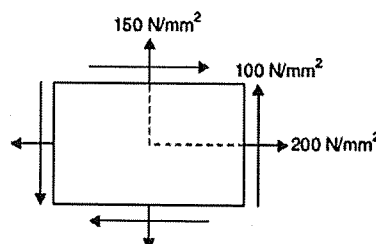
5x10=50M

- 11.A). The bar shown in Fig. is tested in universal testing machine. It is observed that at a load of 40 kN the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material. 10M



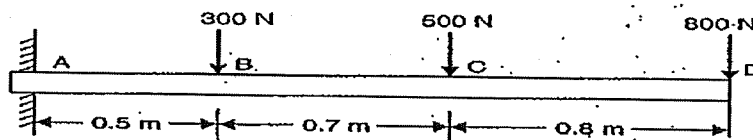
OR

11. B). The state of stress at a point in a strained material is as shown in Fig. Determine (i) the direction of principal planes (ii) the magnitude of principal stresses and (iii) the magnitude of maximum shear stress. 10M



(P.T.O..)

12. A). A cantilever beam of length 2 m carries the point loads as shown in fig. Draw the shear force and Bending moment diagrams for the cantilever beam. 10M



OR

12. B). A timber beam of rectangular section is simply supported at the ends and carries a point load at the center of beam. The maximum bending stress is 12N/mm^2 and maximum shearing stress is 1N/mm^2 . Find the ratios of the span to the depth. 10M

13. A). A beam of length 5m and of uniform rectangular section is supported at its ends and carries a UDL over the entire length. calculate the depth of the section if the maximum permissible bending stress is 8 N/mm^2 and central deflection is not exceed 10 mm. 10M

OR

13. B). Determine the deflection in a cantilever beam subjected to a point load at its free end by using double integration method. 10M

14. A). A hollow shaft, having inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the percentage saving in material, if the material to be used is also the same. 10M

OR

14. B). Derive the torsion equation $\frac{T}{j} = \frac{\tau}{R} = \frac{c\theta}{L}$ 10M

15. A). i) Derive the expression for the stresses in the thin cylinders. 6M
ii) Write the expression for the stresses in spherical shells and thick cylinders 4M

OR

15. B). Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2 . Also sketch the radial pressure distribution and hoop stress distribution across the section. 10M

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R18

Course Code: A30324



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: MACHINE DRAWING

(Mechanical Engineering)

Date: 12.02.2024 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

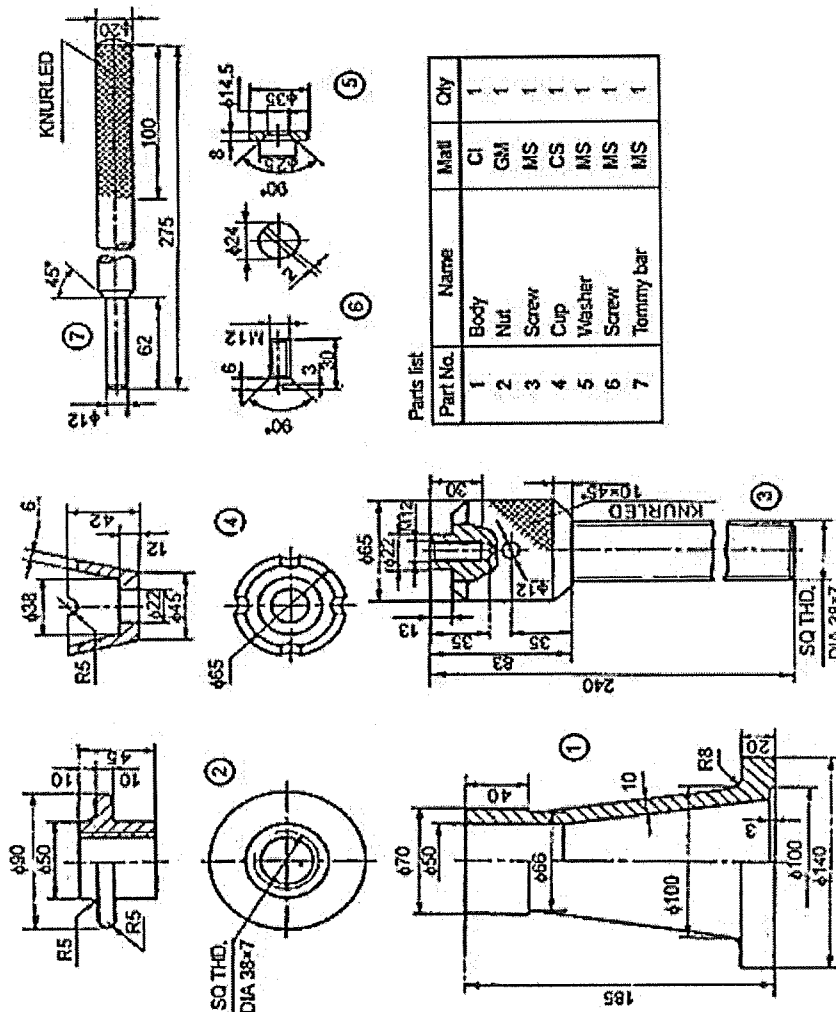
1. Recall the conventional representation for Internal screw threads. 5 M
2. Illustrate the Sharp V thread profile for pitch of thread as 100 mm. 5 M
3. Illustrate Aligned System of dimensioning with a neat sketch. 5 M
4. Illustrate Single riveted lap joint 5 M
5. Recall *Abbreviations* of Approximate, Centre line, Material, Mechanical, Millimetre, Cylinder, Diameter, Dimension, Radius, Square 5 M

PART-B

Answer the following. Question carry FIFTY Marks.

1x50=50M

6. Develop (i) half sectional view from front with right half in section (ii) view from above 50M
for assembly drawing of screw jack.





CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common for CE & ME)

Date: 14.02.2024 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks.

10x2=20M

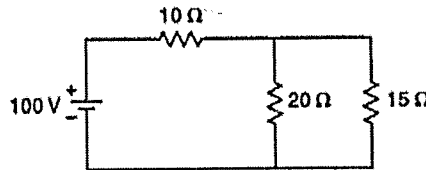
- | | |
|--|-----|
| 1. State and explain Ohm's law. | 2 M |
| 2. List the operating forces present in indicating instruments. | 2 M |
| 3. How are DC generators classified? | 2 M |
| 4. What are the applications of DC motors? | 2 M |
| 5. Define voltage regulation of a transformer. | 2 M |
| 6. Draw torque speed characteristics of three phase induction motor. | 2 M |
| 7. Name the two types of reverse breakdowns which occur in a P-N junction diode. | 2 M |
| 8. What are three regions of operation of a transistor? | 2 M |
| 9. What is meant by the deflection sensitivity of a CRO? | 2 M |
| 10. Write the applications of CRO. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Using Thevenin's theorem find the current through 15 Ω resistor in figure shown. 10M

**OR**

11. B). Describe the construction and working of PMMC instrument. 10M
12. A). Give the diagram and explain the working of a three point starter. 10M
- OR**
12. B). Describe the construction of DC machine with neat diagram. 10M
13. A). Derive an expression for the emf induced in a transformer winding. 10M
- OR**
13. B). Discuss the principle of operation of three phase induction motor. 10M
14. A). Draw and explain V-I characteristics of P-N junction diode. 10M
- OR**
14. B). Illustrate with a diagram, how the transistor acts as an amplifier. 10M
15. A). Draw the block diagram of a CRO and explain the function of each block. 10M
- OR**
15. B). Describe the voltage, current and frequency measurements using CRO. 10M
