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R18

Course Code: A30321



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March -2023
Course Name: MATERIALS ENGINEERING

(Mechanical Engineering)

Date: 20.02.2023 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. What is Ductility? 2 M
2. Define Unit cell. 2 M
3. What are the factors affecting the fatigue life? 2 M
4. What is Hook's law? 2 M
5. Define Pearlite. 2 M
6. Draw the cooling curve for pure metal. 2 M
7. What is Normalizing? 2 M
8. What is surface hardening? 2 M
9. Classify different types of cast iron. 2 M
10. What are alloying elements in steels? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). What is critical resolved shear stress? Calculate the critical resolved shear stress for slip. 10M
- OR**
11. B). Explain the following:
- i) Edge dislocation 5M
 - ii) Screw dislocation 5M
12. A). Explain about Non Destructive Testing (NDT) with any two methods. 10M
- OR**
12. B). i) Discuss Griffiths theory of brittle fracture. 5M
- ii) Draw the typical S-N diagram for mild steel with explanation. 5M
13. A). Draw Iron-iron carbide equilibrium diagram and label all fields. Using this diagram explains the solidification of hyper eutectoid steels and hypo eutectic cast irons. 10M
- OR**
13. B). i) What is the importance of phase diagrams? Explain. 3M
- ii) What is peritectoid reaction? Draw a labeled phase diagram showing this reaction. Also give examples. 7M

(P.T.O..)

14. A). i) Explain the need of tempering hardened steel. Describe the process of tempering. 5M
ii) Distinguish between Carburizing and Nitriding. 5M

OR

14. B). Draw the TTT diagram for Fe-Carbon alloys and label the phases. 10M

15. A). Discuss various alloys of copper and their composition and applications. 10M

OR

15. B). Distinguish how the composite materials differ from metallic alloys. Explain with examples and their applications. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March-2023

Course Name: THERMODYNAMICS

(Mechanical Engineering)

Date: 22.02.2023 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 the terms: (i) Process (ii) Point Function. 2 M
2. Explain the causes of irreversibility. 2 M
3. During a path 1-2-3, a system absorbs 100 KJ of heat and does 16 KJ of work, while along the path 1-4-3, it does 200 KJ of work. Estimate the heat absorbed during the cycle 1-4-3. 2 M
4. If a gas of volume 6000 cm³, pressure 100 kPa, is compressed quasi-statically according to $PV^2 = C$ until the volume becomes one third. Interpret the final pressure and work transfer. 2 M
5. In a cyclic process the work done on the system is 30 kJ and the work done by the system is 50 kJ. Evaluate the network transfer. 2 M
6. What are the Limitations of First Law of Thermodynamics? 2 M
7. Explain Free Expansion Process. 2 M
8. Define Dryness Fraction. 2 M
9. Show Otto cycle on P-V diagram. 2 M
10. Define the term Thermal Efficiency. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Distinguish between Microscopic and Macroscopic approaches. 5M
 ii) A new temperature scale in degrees "N" is to be defined whose boiling and freezing points are 400⁰ N and 100⁰ N respectively. Interpret the reading on new scale corresponding to 60⁰C. 5M

OR

- 11.B). i) List out different types of Thermodynamic Systems? Explain with at least three applications of each. 5M
 ii) A mass of gas is compressed in a quasi-static process from 80 kPa, 0.1 m³ to 0.4 MPa, 0.3 m³. Pressure and volume are related by $PV^n = C$. Determine the work and heat transfer of the system. 5M

12. A). The values of heat transfer and work transfer for four processes of a thermodynamic cycle are given below. Evaluate the thermal efficiency of the cycle. 10M

Process	Heat Transfer (kJ)	Work Transfer (kJ)
1-2	300	300
2-3	0	250
3-4	-100	-100
4-1	0	-250

(P.T.O..)

OR

12. B). In a gas turbine, the gas enters at the rate of 5 kg/s with a velocity of 50 m/s and enthalpy of 900 kJ/kg. It leaves the turbine with a velocity of 150 m/s, enthalpy 400 kJ/kg. The loss of heat from the gases to the surroundings is 25 kJ/kg. The inlet conditions to be at 100 kPa, 27°C. Assume $C_p = 1.004$ kJ/kg K, $R = 0.285$ kJ/kg K. Evaluate the power output of the turbine and diameter of the inlet pipe. 10M

13. A). Two reversible engine operate between thermal reservoirs at 1200 K, T_2 K and 300 K such that 1st engine receives heat from 1200 K reservoir and rejects heat to thermal reservoir at T_2 K, while the 2nd engine receives heat from thermal reservoir at T_2 K and rejects heat to the thermal reservoir at 300 K. The efficiency of both the engines is equal. Evaluate the value of temperature T_2 . 10M

OR

13. B). Estimate the maximum work obtainable from two finite bodies at temperatures T_1 and T_2 . 10M

14. A). At the inlet and exit of the steam turbine, the specific enthalpies are 3250 kJ/kg and 2160 kJ/kg respectively. The rate of heat lost per kg of steam is 300 kJ. The changes in KE and PE were neglected. Determine the turbine work per kg. 10M

OR

14. B). Derive Maxwell's relations. 10M

15. A). Compare Otto, Diesel and Dual cycles for same compression ratio and heat rejection. 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 and (iii) mean effective pressure. 10M

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Course Code: A30181



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March-2023

Course Name: MECHANICS OF SOLIDS

(Mechanical Engineering)

Date: 24.02.2023 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. Discuss in detail how the temperature stresses are developed in compound bars. | 2 M |
| 2. Define the term volumetric strain and shear strain. | 2 M |
| 3. List out the assumptions made in pure bending of beams. | 2 M |
| 4. Write a short note on shear stress distribution in any member. | 2 M |
| 5. Write a short note on Double integration method. | 2 M |
| 6. State Maxwell reciprocal theorem with a neat sketch. | 2 M |
| 7. Write a short note on deformations in circular shafts. | 2 M |
| 8. Discuss about the concept of stresses in helical springs. | 2 M |
| 9. Explain the concept of hoop stress in cylinders subjected to internal pressure. | 2 M |
| 10. Discuss about the deformations of thick and thin cylinders. | 2 M |

PART-B

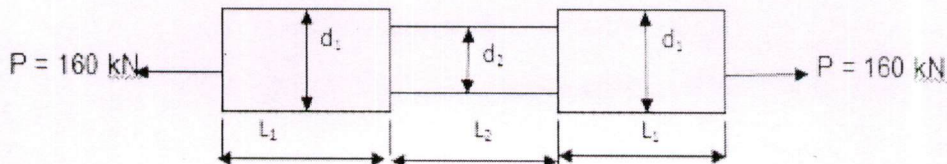
Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). A straight bar 60cm long consists of three portions the first 18 cm length is of 30mm diameter, the middle 26 cm length is of 20mm dia. and the remaining 16 cm length is of 25 cm dia. If it is subjected to an axial pull of 100kN find the total extension of the bar. Find also the stresses, strains and changes in length of different portions. Take $E = 200 \text{ GPa}$. 10M

OR

11. B). The stepped circular steel bar shown in fig. is subjected to an axial load P of 160kN the stress in the middle portion is limited to 150MPa. Determine the diameter and the length of middle portion, if the total elongation of the bar is limited to 0.3mm. The modulus of elasticity for steel is 200GPa. $d_1 = 50\text{mm}$, $L_1 = 100\text{mm}$. 10M



(P.T.O..)

12. A). A cantilever of length 6m carries two point loads of 2kN and 3kN at distance of 1m and 6m from fixed end respectively. In addition to this the beam carries a uniformly distributed load of 1kN/m run over entire length of 2m at a distance of 3m from the fixed end. Draw the S.F and B.M diagrams for the cantilever. 10M

OR

12. B). A simply supported beam of length 8m carries point loads of 4 kN and 6 kN at a distance of 2 m and 4m from the left end. Draw the S.F and B.M diagrams for the beam. 10M

13. A). For a cantilever beam with point load acting at the center of the span, determine the equation for deflection curve using double integration method. Determine the maximum deflection of the beam also. 10M

OR

13. B). A simply supported beam of length 4 m and rectangular cross section 2 cm × 8 cm carries a uniformly distributed load of 2000 N/m. The beam is titanium, having $E = 100 \text{ GPa}$. Derive the deflection curve. Also determine the maximum deflection of the beam if the 8-cm dimension is vertical. 10M

14. A). A hollow steel shaft of external diameter 130mm and internal diameter 90mm is 1.2m long. Find the maximum torque required to produce a twist of 0.6 degree over the length of the shaft. Take $C = 8 \times 10^4 \text{ N/mm}^2$. 10M

OR

14. B). A solid circular shaft is to transmit 300 kW at 100 r.p.m. If the shear stress is not to exceed 80 N/mm^2 , find the diameter of the shaft. What percentage in saving would be obtained if this shaft is replaced by a hollow one, whose internal diameter is equal to 0.8 of the external diameter keeping the length, the material and the allowable maximum shear stress being the same? 10M

15. A). A cylindrical shell 3.25m long, 1m in diameter is subjected to an internal pressure of 1 N/mm^2 . If thickness of the shell is 10mm, find the circumferential and longitudinal stresses. Also find the changes in the dimensions of the shell. Take $E = 2 \times 10^5 \text{ N/mm}^2$, Take Poisson Ratio = 0.3. 10M

OR

15. B). A thin cylindrical vessel of 2m 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 maximum thickness required. 10M

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Course Code: A30324



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March-2023

Course Name: MACHINE DRAWING

(Mechanical Engineering)

Date: 27.02.2023 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 conventional representation of Petrol. 5M
2. Sketch the Square thread profile for pitch of thread as 100 mm. 5M
3. Sketch Uni-directional System of dimensioning. 5M
4. Sketch Single riveted lap joint to joint plates of 10 mm thickness. 5M
5. Draw the front view of the solid journal bearing shown in fig. 1 5M

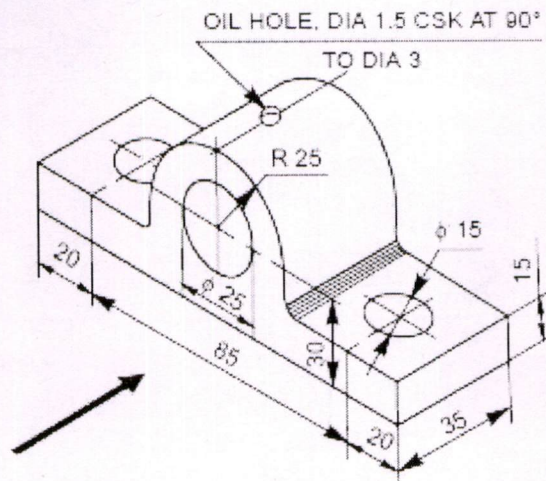


Fig. 1

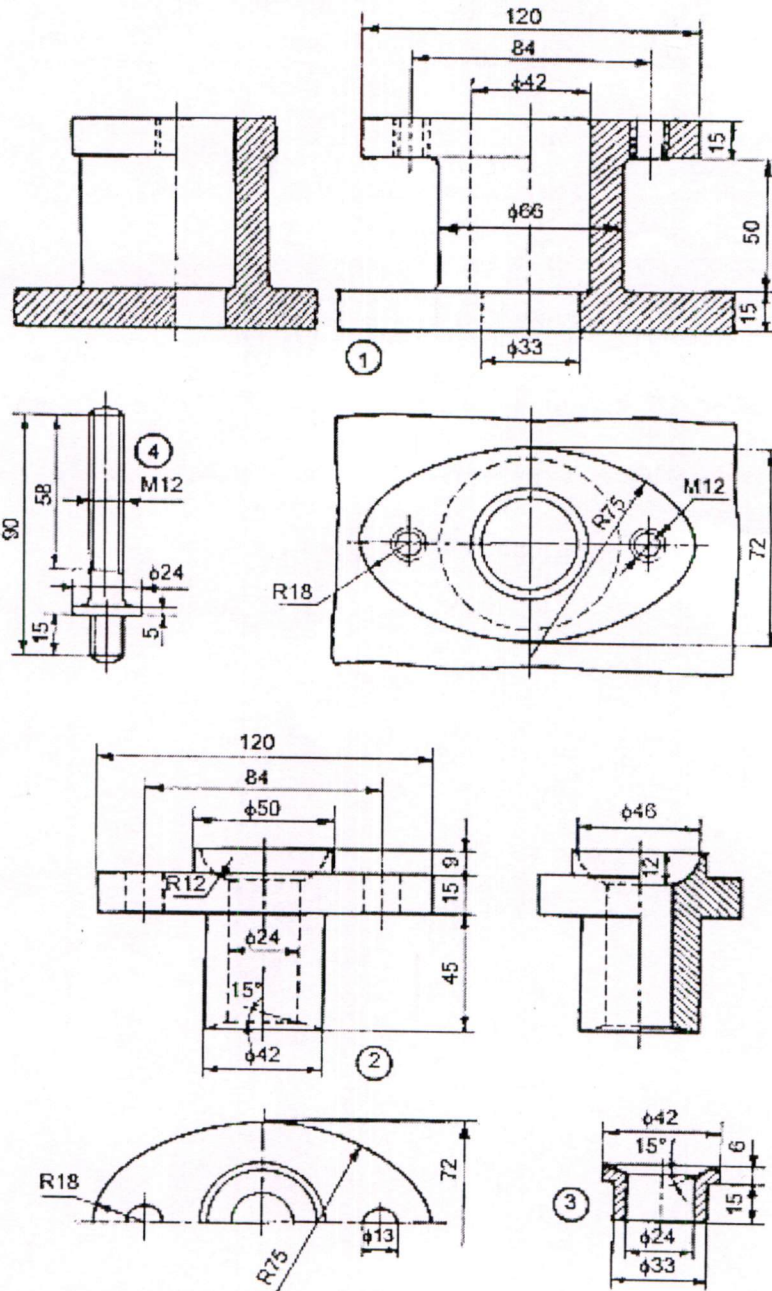
(P.T.O.)

PART-B

Answer the following question. 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 stuffing box.



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

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Course Code: A30226



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March-2023
Course Name: BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common for CE & ME)

Date: 01.03.2023 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

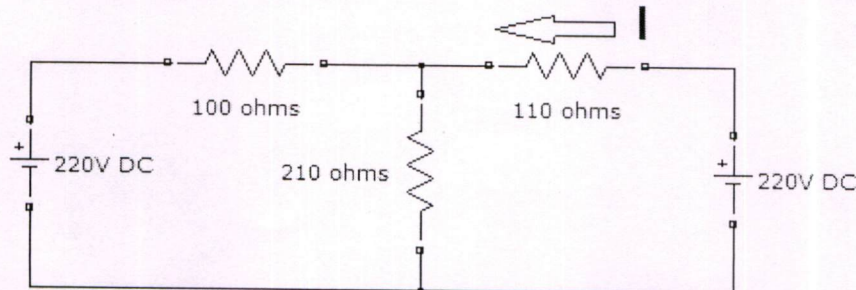
1. State Ohm's law. 2 M
2. State Maximum power transfer theorem. 2 M
3. Classify the DC Motors. 2 M
4. Write the Principle of operation of the DC generator. 2 M
5. Define Slip. 2 M
6. State the principle of operation of a single-phase transformer. 2 M
7. List the applications of diode. 2 M
8. Draw the V I characteristics of the Diode. 2 M
9. List the applications of CRO. 2 M
10. Distinguish between CRO and ordinary measuring instruments. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). In the figure given below, using superposition theorem determine the current flowing through 110 Ω resistor 10M

**OR**

11. B). i) Distinguish between MI and MC instruments. 4M
- ii) Explain the construction and working principle of PMMC instrument with neat sketch. 6M
12. A). Derive the EMF equation of DC generator. 10M

OR

12. B). Derive the expression for torque developed in a DC Motor. 10M

(P.T.O..)

13. A). Define the term voltage regulation of Alternator. Develop the formula for voltage regulation of 3-phase alternator by Synchronous impedance method. 10M

OR

13. B). Explain various Losses in a Single-Phase Transformer. Derive the condition for Maximum efficiency. 10M

14. A). Explain the principle of operation of half-wave rectifier with neat wave forms. 10M

OR

14. B). What are different modes of operation of transistors? And explain how the transistor acts as an amplifier. 10M

15. A). What is a CRO (Cathode Ray Oscilloscope) & explain its Working with neat sketch. 10M

OR

15. B). Explain how the CRO can be used for Measurement of Frequency. 10M

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Course Code: A30531



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Regular & Supplementary Examinations Feb/March-2023

Course Name: PYTHON PROGRAMMING

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

Date: 03.03.2023 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. Mention any two features of Python. 2 M
2. What is implicit conversion? Give an example. 2 M
3. Python strings are immutable. Justify. 2 M
4. Do Loop statements have else clause? When will it be executed? 2 M
5. How will you update list items? Give one example. 2 M
6. What is difference between list and tuple in python? 2 M
7. Explain what a constructor does. 2 M
8. How is the lifetime of an object determined? What happens to an object when it dies? 2 M
9. Explain what happens when a program receives a non-numeric string when a number is expected as input. 2 M
10. When would you make a data field read-only, and how would you do this? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Write Python Program to reverse a number and also find the Sum of digits in the reversed number. Prompt the user for input. 10M
- OR**
11. B). Explain the basic data types available in Python with examples. 10M
12. A). Write a function to determine whether a given natural number is a perfect number. A natural number is said to be a perfect number if it is the sum of its divisors. 10M
- OR**
12. B). List the three types of conditional statements and explain them. 10M
13. A). Write a Python program to add 'ing' at the end of a given string (length should be at least 3). If the given string already ends with 'ing' then add 'ly'. instead. If the string length of the given string is less than 3, leave it unchanged. 10M
- OR**
13. B). Compare and contrast different functions and methods used in dictionaries and set. 10M

(P.T.O..)

14. A). i) Write a short notes on different built in attributes associated with a class. 5M
ii) With the help of examples explain the concept of class methods and static methods. 5M

OR

14. B). Write a program that uses datetime module within a class. Enter manufacturing date and expiry date of the product. The program must display the years, months, and days that are left for expiry. 10M

15. A). Write a line of code that adds a Float Field to a window, at position (1, 1) in the grid, with an initial value of 0.0, a width of 15, and a precision of 2. 10M

OR

15. B). Describe the Graphical user interface using the tkinter module and widgets. 10M
