G 1421 (Pages : 2) Reg. No.....ME.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical Engineering

MECHANICS OF MATERIALS (M)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Write down the equations relating elastic constants E, G and K.
2. Write down the fourth order differential equation of two–dimensional elasticity problem in terms of the stress function.
3. What is a strain ellipsoid ?
4. Define strain energy. Write down an equation for strain energy in terms of stress and strain.
5. Define principal axes of strain. Mention how it is found out.
6. Write down the differential equation of stress function in polar Co-ordinates for a case with circumferential symmetry.
7. Write down the equation for circumferential strain in an axi-symmetric elasticity problem.
8. Explain disk of uniform strength.
9. What is strain rosette ?
10. What are compound cylinders ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Explain the equations to be integrated for solving a two-dimensional elasticity problem.
    (b) Discuss the use of polynomials in the solution of problems of elasticity.

Or

12. (a) Define stress at a point. Explain how stress at a point is mathematically expressed.
    (b) Explain the construction of Mohr circle for strain Rosette.
13. (a) Explain homogeneous deformation.
    (b) What are compatibility equations ? Write any two compatibility equations.

Or

Turn over

14. Determine the stress invariants and principal stress of the following stress at a point

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 4 \\ 0 & 4 & -3 \end{bmatrix} \text{ kN/m}^2.$$

15. (a) Explain Saint–Venant's principle.

(b) Write down the boundary conditions for solving stress in a rotating disc with a central hole.

Or

16. Derive the equations for radial stress and tangential stress during pure bending of curved bars.

17. Derive the equations of radial stress and tangential stress across the thickness of a thick cylinder with zero external pressure and a given internal pressure.

Or

18. Write down the differential equation of equilibrium of a rotating cylinder. Explain how this equation can be solved.

19. Explain the method of photo elastic stress measurement.

Or

20. Derive Winkler–Bach formula for bending a curved beam of rectangular cross section.

(5 × 12 = 60 marks)

G 1430 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical Engineering

METROLOGY AND INSTRUMENTATION (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Distinguish between Line standard and End standard.
2. Distinguish between Accuracy and Repeatability of a measuring instrument.
3. Explain the use of "go-no go" gauges in checking diameters.
4. What do you mean by interference fit and where is it used ?
5. What are the desirable properties of a gauge material ?
6. Explian the different ways of expressing surface roughness.
7. Explain the term sensitivity of a measuring instrument.
8. Explain the working of a strain gauge type tool dynamometer.
9. Differentiate between RTD and thermocouple.
10. What isa CMM ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. Explain the various types of errors in measurement and the methods for preventing them.

Or

12. Explain the working of an LVDt type electrical comparator.

13. What is paper layout gauging ? Explain the steps involved with appropriate examples.

Or

14. Explain how a sine bar be used to measure the taper angle of a lathe dead centre.

15. Explain the working of an auto-collimator. How can it be used to check a milling machine table ?

Or

16. Explain the construction and working of Tomlinson surface meter with the help of a neat diagram.

Turn over

17. Explain the two-wire and three-wire method for measurement of screw threads.

Or

18. Explain the composite gear testing method. How the composite errors can be distinguished from tooth to tooth errors ?

19. Explain the construction and working of a piezoelectric accelerometer.

Or

20. What do you mean by calibration ? How a thermocouple can be calibrated ?

(5 × 12 = 60 marks)

G 1439 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical Engineering

THERMAL ENGINEERING—II (M)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer all *questions.*

Part A

Each question carries 4 *marks.*

1. What is meant by valve overlap, and in what part of the cycle does it occur ?
2. Define Octane number rating. What does it indicate ?
3. Why is a choke used on a carburetor, and how does it operate ?
4. Draw a schematic circuit diagram of a battery ignition system and label all the components.
5. Does the antiknock quality of a fuel have any effect on detonation in an engine ? In what way ?
6. How is the viscosity of an oil measured ? What are the units commonly used ?
7. What are the reasons for operating a CI engine at an A/F ratio higher than chemically correct ?
8. Why do the turbulent type combustion chambers cause higher heat transfer than those of the non-turbulent types ?
9. What do you understand by the term EGR ? How EGR reduces NOx emissions ?
10. Discuss the various efficiency terms associated with an engine.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

Module 1

11. (a) Explain the operation of a four stroke petrol engine.

Or

(b) Explain by means of suitable graphs the effect of dissociation on maximum temperature and brake power. How does the presence of CO affect dissociation ?

12. (a) Explain about supercharging and turbo charging of engines.

Or

(b) Explain the following terms :—

(i) Ignition timing and spark advance ; (ii) Lubrication system ; (iii) Cooling system.

Turn over

13. (a) Explain the following with respect to SI engine combustion :—

(i) Flame propagation ; (ii) Abnormal combustion ; (iii) Detonation.

Or

(b) Explain with figure various types of combustion chambers used in SI engines.

14. (a) Explain the stages of combustion in a CI engine.

Or

(b) Name a design of CI engine combustion chamber representing non-turbulent type and three different designs representing turbulent types. Sketch each of them to show major variations and explain.

15. (a) Explain the measurement of exhaust smoke and exhaust emission in engines.

Or

(b) Explain the effect of the following factors on the performance of an SI engine (i) compression ratio ; (ii) air fuel ratio ; (iii) spark timing ; (iv) engine speed ; (v) mass of inducted charge ; (vi) heat losses.

(5 × 12 = 60 marks)

G 1447 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical/Automobile Engineering

HEAT AND MASS TRANSFER (MU)

(Regular / Improvement / Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Explain the variation of thermal conductivity of liquids and gases with temperatures.
2. Explain the analogy between heat transfer by conduction and flow of electricity through ohmic resistance.
3. What do you understand by the term "convective heat transfer" and "overall heat transfer" ?
4. What do you understand by the hydrodynamic and thermal boundary layers ?
5. In what situation, the effectiveness approach to heat exchanger calculations has advantages over the log mean temperature difference approach ?
6. What is meant by fouling factor? How does it affect the performance of a heat exchanger ?
7. State Stefan Boltzmann law of total radiation from a black body ?
8. What are radiation shape factors and why are they used ?
9. State Pick's law of diffusion. Define the various symbols used and given their units.
10. How does liquid pressure affect the boiling heat transfer ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Derive the general 3 dimensional heat conduction equation in Cartesian coordinates for a homogeneous and isotropic material.

Or

(b) Show that for a plane wall of thickness 21 with a uniformly distributed heat generation q_g per unit volume, the temperature t_0 at the mid plane is prescribed by the relation, $t_0 = (q_g\ l^2 / 2k) + t_w$ where t_w is the temperature on either side of the wall and k is the thermal conductivity of wall material.

Turn over

12. (a) Explain in detail the mechanism of forced convection. Show by dimensional analysis that for problems involving forced convection, the Nusselt number can be expressed as a function of Prandtl number and Reynolds number.

Or

(b) A hot square plate 40 cm X 40cm at 100° C is exposed to atmospheric air at 20°C. Make calculations for the heat loss from both surfaces of the plate, if (i) the plate is kept vertical (ii) plate is kept horizontal.

13. (a) Working in terms of inlet and outlet temperatures of the fluids and overall heat transfer coefficient, develop an expression for the heat transfer from one fluid to another in a conventional (i) parallel flow and (ii) counter flow heat exchanger.

Or

(b) In a shell and tube heat exchanger, water flows through the shell making one pass at the rate of 0.45 kg/s and is heated from 20° C to 36.67° C by an oil having a specific heat of 0.465 kj/kgK. The oil enters the exchanger at 93.33°C and leaves at 60° C after making two tube passes. Determine the heat exchanger area for an overall heat transfer coefficient of 0.943 kw/m^2K.

14. (a) State and prove Kirchoff 's law in radiative heat transfer. Estimate the net radiant interchange per square meters for two very large planes at temperatures 538°C and 315°C respectively. Assume the emissivity of the hot and cold planes are 0.9 and 0.7 respectively.

Or

(b) Define (i) Absorptivity (ii) Reflectivity (iii) Transmissivity. A room $3 \times 3 \times 3$ m^2, has one side wall maintained at 260°C; the floor is maintained at 90°C. The other four surfaces are perfectly insulated. Assume that all the surfaces are black. Calculate the net heat transfer between the hot wall and the floor.

15. (a) State and explain the different modes of mass transfer. Distinguish between molecular diffusion, thermal diffusion, pressure diffusion and forced diffusion.

Or

(b) Explain the phenomenon of nucleate boiling. List the factors that affect nucleate boiling. List some empirical correlations that have been suggested for determining the boiling heat transfer in nucleate and film boiling.

($5 \times 12 = 60$ marks)

G 1456 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

PRINCIPLES OF MANAGEMENT AND ENGINEERING ECONOMICS (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer Part A and Part B in **separate** *answer-books.*

Answer **all** *questions.*
All questions carry equal marks.

Part A (Principles of Management)

1. (a) Explain the organization structure of a manufacturing company.
   (b) What are the main considerations in the design of organization structure ?

Or

2. (a) Explain line and staff organization. What are its advantages and disadvantages ?
   (b) Discuss the need for organization structure.
3. (a) What is group cohesiveness ? How it is related to performance ?
   (b) What is sales force training ? Bring out its significance in sales force development.

Or

4. (a) What is sales promotion ? Discuss the role and limitations of sales promotion.
   (b) Discuss the factors govern the choice of a channel of distribution.
5. (a) Explain Total Quality Management operation.
   (b) Explain quality documents and systems needed for the TQM.

Or

6. (a) Explain the important steps involved in re-engineering process.
   (b) Distinguish between public sector and private sector companies.

Part B (Engineering Economics)

7. (a) Explain any three monetary and the fiscal measures to control inflation.
   (b) Explain the importance of the law of Diminishing Marginal Utility.

Or

8. (a) Explain Demand curve and Law of Demand.
   (b) Explain the concept of inflationary gap and its important effects.

Turn over

9. (a) What are the functions of IRBI ? How does it help sick industrial units ?

   (b) Discuss the role of IDBI in financial small enterprises in India.

Or

10. (a) Explain objects and functins of UTI.

    (b) Explain the role of RBI in Indian economy.

11. (a) Explain the services and functions of a stock exchange market.

    (b) Discuss the functions of commercial banks and illustrate the credit creation function.

Or

12. (a) Explain the role of public sector companies in the development of Indian economy. Suggest measures to improve the performance of public sector enterprises.

    (b) Discuss the role of multinational companies in Indian economy and their contribution to economic growth.

G 1465 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

COMPUTER AIDED DESIGN AND MANUFACTURING (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Module I

1. (a) Write specification of a CAD workstation and explain what each terms indicates.
   (b) Discuss different types of storage devices used in CAD.
   (c) Briefly explain the requirement of a CIM software.
   (d) Compare DDA and Bresenham Line Algorithm. (4 × 5 = 20 marks)

Or

2. (a) Compare different types of display devices in CAD.
   (b) What is meant by graphic standards ?
   (c) What are different types of 3D modelling Techniques ?
   (d) Compare special features of any two CAD software packages. (4 × 5 = 20 marks)

Module II

3. (a) Discuss open loop and closed loop systems.
   (b) Discuss encoders.
   (c) Draw layout representing the features of CNC and DNC machines.
   (d) Write an NC program to mill a letter "L" of 20 mm width on a metal plate. (4 × 5 = 20 marks)

Or

4. (a) Write a ladder program for the operation of two motors with a starting time lag of 20 minutes and stopping of both after 1 Hr.
   (b) What are resolvers ?
   (c) Discuss absolute and incremental coordinate system.
   (d) Discuss input devices used in NC Machines. (4 × 5 = 20 marks)

Turn over

Module III

5. (a) Write a NC programming statement and discuss each terms.

(b) Write notes on cutter diameter compensation.

(c) Discuss major part of vectical CNC milling Machine.

(d) Write functions of the M codes used in CNC Lathe.

(4 × 5 = 20 marks)

Or

6. (a) Discuss important commands in an APT Language.

(b) Draw layout representing CAPP of assembly procedure of any machine parts.

(c) Write notes on computer aided Part programming.

(d) How interactive computer Graphics windows helps for NC part Programming ?

(4 × 5 = 20 marks)

Module IV

7. (a) Give an example for part name given according to Group Technology procedure. What each letter or number indicates.

(b) What is meant by Artificial intelligence ?

(c) Discuss different types of process planning software.

(d) Discuss the advantages of Group Technology.

(4 × 5 = 20 marks)

Or

8. (a) Discuss the basic forms of classification in Group Technology.

(b) What is mean by part family and cell ?

(c) Describe retrieval CAPP system.

(d) Draw process layout of a machine component based on Group Technology concepts.

(4 × 5 = 20 marks)

Module V

9. (a) Name different types of effectors used in Robotics.

(b) Discuss different types of Robot programming language.

(c) Discuss DOF of a robot arm.

(d) Draw layout representing vision system in a robot.

(4 × 5 = 20 marks)

Or

10. (a) Discuss different methods to guide robot 1 a desired path.

(b) What is meant by weight carrying capacity of a Robot ?

(c) Describe intelligent robot.

(d) Write notes on Pneumatic Robots.

(4 × 5 = 20 marks)