G 6878 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch : Mechanical / Automobile Engineering

METROLOGY AND INSTRUMENTATION (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries equal *marks*

1. Differentiate between Selective assembly and Interchangeable assembly.
2. Explain traversing length and sampling length in surface roughness measurement.
3. What is a Polar graph? How is it used for finding circularity errors?
4. What is a Penta-prism? Where is it used?
5. Explain the principle of a profile projector.
6. What is a Corioli's flow meter?
7. Explain the use of Optical flats.
8. What are the different gauge materials and describe their advantages.
9. What do you mean by impedance of a sensor? How does it affect the measurements?
10. Differentiate roughness and waviness of a machined surface.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Explain selective fit, Driving fit and shrinkage fit with applications.

Or

12. Explain the construction and working of a mechanical comparator.

Turn over

13. Explain any one method of testing squareness of a surface using dial gauges.

Or

14. How straightness of an edge using autocollimator.

15. Explain how the flatness and parallelism of the two sides of a slip gauge can be tested using interferometry.

Or

16. Explain the method of expressing the surface roughness using RMS and CLA values.

17. Discuss the various errors in screw threads and their causes.

Or

18. Explain the tangential gear tooth caliper for and its use in gear metrology.

19. List the various types of strain gauges and explain their use in measuring force and torque.

Or

20. Explain the working of a pneumatic load cell.

(5 × 12 = 60 marks)

G 6887 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch : Mechanical Engineering

THERMAL ENGINEERING II (M)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. How are SI and CI engine fuels rated?
2. Can alcohol be used for CI engines? Explain.
3. Differentiate between supercharging and Turbo charging?
4. What are the main functions of and fuel injection Pump?
5. Discuss the general principles of SI engine combustion chamber design?
6. What do you mean by ignition lag in SI engine combustion?
7. What effect does the air fuel ratio have on the indicated thermal efficiency in a CI engine?
8. How CI engine combustion chamber are classified?
9. Give a brief account of air pollution due to engines?
10. Discuss about the Bharat stage emission norms in our country.

(10 × 4 = 40 marks)

Part B

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

11. (a) Explain the operation of a two stroke Petrol Engine.

Or

(b) Write short notes about the following fuels :

(i) Biogas.

(ii) Vegetable Oil.

(iii) Alcohol.

Turn over

12. (a) With a neat sketch explain the working principle of a simple carburetor.

Or

(b) Describe briefly the MPFI system with a neat sketch.

13. (a) How do you explain the idea of using direct injection CI engine type combustion chamber in SI engines.

Or

(b) Explain the phenomenon of preignition? How preignition leads to detonation?

14. (a) Explain how the induction swirl is created. What are the requirements of injector with this type of swirl?

Or

(b) How do the injection timing and the fuel quality affect the engine knock?

15. (a) Describe in detail the causes of hydrocarbon emissions from engines.

Or

(b) An eight cylinder four stroke engine of 9 cm bore and 8 cm stroke with a compression ratio of 7 is tested at 4500 r.p.m. on a dynanometer which has 54 cm arm. During a 10 minutes test the dynamometer scale beam reading was 42 kg and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kj/kg. Air 27°C and 1 bar was supplied to the carburetor at the rate of 6 kg/min. Find (i) brake power delivered (ii) brake specific fuel consumption (iii) brake thermal efficiency (iv) volumetric efficiency (v) air fuel ratio.

(5 × 12 = 60 marks)

G 6869 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch—Mechanical Engineering

MECHANICS OF MATERIALS (M)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State Hooke's law. Give the relationship between the three modulii.
2. What is Plane Stress and plane strain ?
3. Write down the compatibility equation in terms in Airy's stress function.
4. Define strain at a point.
5. Explain the effect of small control hole in rotating disc.
6. Write the expressions for shear strain in polar co–ordinates.
7. Write the assumptions made in determining the stress in thick cylinder.
8. Write a short note on shrink fit.
9. Write the expression for stress invariants.
10. What are the assumptions made in Winkler-Bach formula.

(10 × 4 = 40 marks)

Part B

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

1. Derive the strain-displacement relations for three-dimensional system. (12 marks)

Or

2. Analyse the stress function $\phi = Ax^2y$ in terms of Airy's stress function. (12 marks)
3. The strain components at point are :

$\varepsilon_x = 0.001$, $\varepsilon_y = 0.002$, $\varepsilon_z = -0.001$, $P_{xy} = -0.001$, $P_{yz} = -0.004$; $P_{zx} = 0.006$.

Find the strain energy per unit volume. $E = 207 \times 10^6$ kPa. $G = 80 \times 10^6$ kPa.

(12 marks)

Or

Turn over

4. The displacement field for a body is given by $u = \left(x^2 + y\right)i + (3 + z)\,j + \left(x^2 + 2 - y\right)k$. Determine the principal strains at (3, 2, – 1) and the direction of maximum principal strain. (12 marks)

5. Derive the equilibrium equations in polar co-ordinates. (12 marks)

Or

6. Prove that $\phi = c\gamma^2$ is a legitimate Airy's stress function. Derive the stresses from it. (12 marks)

7. Derive the expressions for stresses in thick spherical shells. (12 marks)

Or

8. Show that for a cylindrical vessel with a shell thickness of one-tenth the radius r_i and subjected to internal pressure only, the error involved in computing the hoop stress by thin cylinder formula is approximately 5%. (12 marks)

9. Compare the Maximum tensile stress in the curved part of a hook having circular cross-section with rectangular cross-section. (12 marks)

Or

10. Find the maximum tensile stress of an open link of cross-section 3 cm in diameter when it is subjected to a tensile load P = 14.7 kN. The curved portion of the link has an internal diameter = 4.5 cm. (12 marks)

[5 × 12 = 60 marks]

G 6904 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch : Mechanical 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 carrry equal marks.

Part A (Principles of Management)

1. (a) Explain the importance of planning in Management.

   (b) Discuss the principles of directing.

Or

2. (a) Define Communication. What are the types of communication in an Organization?

   (b) Write a note on span of control. What are the factors affecting it?

3. (a) What are the causes of Stress? Explain the strategies for coping with stress.

   (b) What is advertising department? What factors govern its size?

Or

4. (a) What do you mean by Advertising? Discuss the role and limitations of advertising?

   (b) What are the types of Motives? Explain the theories of work motivation.

5. (a) Distinguish between Public Ltd and Private Ltd company.

   (b) Define Incentive. Explain different types of incentives.

Or

6. (a) Explain advantages and disadvantages of MBO.

   (b) Define Total Quality Management. Discuss dimensions of TQM.

Turn over

Part B (Engineering Economics)

7. (a) Explain the monetary and the fiscal measures to control inflation.

   (b) What is Tax? Explain the classification of Taxes.

Or

8. (a) Explain Demand curve and Law of Demand.

   (b) Explain the effects of inflation on producers and consumers?

9. (a) Distinguish between Demand-pull and Cost-push types of inflation.

   (b) Explain the importance of the law of Diminishing Marginal Utility.

Or

10. (a) What are the causes for the changes in demand? Explain.

    (b) Explain how price is determined in a free Enterprise Economy?

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

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

Or

12. (a) Explain the role of Private sector companies for the development of the economy.

    (b) Discuss about underwriting of securities.

G 6913 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch : Mechanical Engineering / Automobile Engineering

COMPUTER AIDED DESIGN AND MANUFACTURING (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

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

MODULE I

1. (a) Explain various steps in a design procedure with reference to Shiglie model. (10 marks)

(b) Discuss the advantages of CAD. (10 marks)

Or

2. (a) Explain Bresenham Algorithm for line drawing. (10 marks)

(b) Briefly explain different types of input devices used in CAD. (10 marks)

MODULE II

3. (a) What are NC Machines. Discuss important parts in a NC Machine. (10 marks)

(b) Discuss the components in a Ladder program. (10 marks)

Or

4. (a) With suitable example discuss the role of PLC controllers in a Manufacturing Industry. (10 marks)

(b) Compare the features of CNC and DNC Machines. (10 marks)

MODULE III

5. (a) Discuss different types of G Codes and M codes in a NC Part programming. (10 marks)

Turn over

(b) Write a CNC program to mill 3 concentric circles in a metal plate with 30 mm offset distance. (10 marks)

Or

6. (a) Discuss different types of programming languages used in NC Machines. (10 marks)

(b) Write a NC programme to generate Stepped profile from a cylindrical billet (Assume suitable dimension) (10 marks)

MODULE IV

7. (a) Discuss the features in a CAPP system. (10 marks)

(b) Discuss the advantages of Group technology. (10 marks)

Or

8. (a) Discuss various components in a AI system. (10 marks)

(b) Discuss different systems of coding used in Group Technology (10 marks)

MODULE V

9. (a) Discuss basic structural configuration of a robot system. (10 marks)

(b) Discuss different types of actuators used in Robot System. (10 marks)

Or

10. (a) Discuss different types of robot programming languages. (10 marks)

(b) Discuss different types of sensors used in Robot System. (10 marks)

G 6895 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Sixth Semester

Branch : Mechanical / Automobile Engineering

HEAT AND MASS TRANSFER (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours **Maximum : 100 Marks**

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. A person who sits in front of a fireplace feels warm. Through what process or processes of heat trasfer does he receive heat?
2. What is meant by a Lumped Capacity?
3. Explain Reynolds analogy of heat and momentum transfer.
4. Differentiate between mechanisms of heat transfer by free and forced convection.
5. State and explain Wien's displacement Law.
6. Define radiation shape factor and explain the reciprocity relation?
7. Sketch a shell and tube type heat exchanger.
8. Under what conditions does the fin efficiency become nearly 100%.
9. Discuss different modes of Mass transfer, giving *one* example for each.
10. How is Reynolds number defined for film condensation?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. (a) Explain the concept of Thermal contact resistance. A furnace wall consist of an inside layer of silica brick 10 cm thick. (k = 6.28 kj/m-hr°C) followed by a 20 cm layer of magnesite brick (k = 20.95 kj/m-hr°C) on the outside. The inside surface of the silica brick wall is maintained at 750°C while the outside surface of magnesite is at 125°C.

The contact thermal resistance between the two walls at the interface is 0.000716 hr-°C/kj per unit wall area. What is the rate of heat loss, per unit area of the wall? Also calculate the temperature drop at the interface.

Or

(b) A 10 cm diameter apple, approximately spherical is shape, is taken from a 20° C environment and placed in a refrigerator where temperature is 5° C and average convective heat transfer coefficient over the surface of apple is 6 W/m² K. Calculate the temperature at the centre of the apple after a period of 1 hour. Thermo physical properties of apple are: p = 998 kg/m³; c = 4180 J/kg K; k = 0.6 W/m K.

12. (a) Calculate the rate of heat loss from a human body which may be considered as a vertical cylinder 30 cm in diameter and 175 cm high in still air at 15° C. The skin temperature is 35° C and emissivity at the skin surface is 0.4. Neglect sweating and effect of clothing.

Or

(b) What is meant by critical thickness of insulation? A thin cylinder of radius r is lagged to an outer radius r_0 with an insulating material of thermal conductivity k. Show that the maximum steady radial heat transfer rate occurs when $r_0 = k / h_0$ where h_0 is the heat transfer rate against r_0 for all values of r_0 between r and infinity. Ignore the cylinder end effects.

13. (a) How water having specific heat 4200 J/kg K flows through a heat exchanger at the rate of 4 kg/min with an inlet temperature of 100° C. A cold fluid having a specific heat 2400 J/kg K flows in at a rate of 8 kg/min and with inlet temperature 20°C. Make calculations for the maximum possible effectiveness if the fluid flow conforms to (i) parallel flow arrangement (ii) counter flow arrangement.

Or

(b) Two fluids pass through a heat exchanger, the cold fluid is heated from 40° C to 90° C while the hot fluid is cooled from 200° C to 100° C. (i) What percentage saving in surface area is made by using a counter flow exchanger instead of a parallel flow. (ii) What are the temperatures of the two fluids at the middle of the exchanger for parallel flow arrangement?

14. (a) Define Lambert's consine law of radiation and prove that the intensity of radiation is always constant at any angle of emission for a diffused surface.

Or

(b) Is the Absorptivity of a surface equal to emissivity? If so, does this mean that energy absorbed is always equal to the energy emitted? Does it also mean that the net exchange of radiation energy is always equal to zero? If not, is this a violation of the Kirchoff's law? Compute the rate of absorption and the rate of emission from a small body at 350 K which has been placed in a large furnace whose walls are maintained at 1250 K temperature. The dependence of the total emissivity of this body on temperature has been indicated below:

Temperature, K	350	600	850	1250
Absorptivity, α	0.75	0.64	0.59	0.50

15. (a) Explain the various regimes of saturated pool boiling.

Or

(b) Express Fick's law of diffusion in terms of mass and mole fractions. Develop a relation expressing the equivalence of diffusion coefficients in a binary system.

(5 × 12 = 60 marks)