F 3572 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

METROLOGY AND INSTRUMENTATION (MU)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is meant by accuracy of a measuring instrument ?
2. What are random errors ? State the common causes of their occurrences ?
3. Define straightness of line in two planes.
4. What do you mean by spirit level ?
5. What are the parameters used in surface finish measurement ?
6. Enumerate the three components of a surface texture ?
7. List out the types of screw threads.
8. What are the applications of thread gauge ?
9. List out the uses of Bi materials.
10. Differentiate between vibrometers and Beck with accelerometers.

(10 × 4 = 40 marks)

Part B

11. Explain about optical comparators with neat sketch.

Or

12. Describe the line and end measurement, how to make conversion from line standard to end standard.
13. Explain the different methods of flatness testing.

Or

Turn over

14. Describe in detail about angle measuring devices of protractors and sensitive spirit levels.

15. Explain in detail the micrometer microscope.

Or

16. Describe any *three* methods of measurement of surface texture.

17. Explain about the types of screw thread gauges.

Or

18. Describe the tooth thickness of the pitchline and the constant chord method for tooth thickness measurement.

19. Explain the calibration of flow measuring devices.

Or

20. Describe in detail the total radiation pyrometer.

(5 × 12 = 60 marks)

F 3581 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch : Mechanical Engineering

THERMAL ENGINEERING—II (M)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

1. How are the specific heats varied with temperature ?
2. Write short notes on Alternate fuels.
3. Explain briefly about the A/F mixture requirement for the idling, cruising and power ranges for an IC engine.
4. What is meant by supercharging ? How is it different from turbo charging ?
5. Mention the required properties of lubricants.
6. Mention few engine variables considered as Density factors that have effect on SI engine knock.
7. Name the stages of combustion in a diesel engine.
8. What is meant by Auto ignition in SI engines ?
9. Mention various performance parameters of IC engines.
10. Name the important pollutants from SI and CI engines.

(10 × 4 = 40 marks)

Part B

1. (a) Explain the principle of operation of petrol engine in which one cycle of operations is completed in two revolutions of the crankshaft.

Or

(b) (i) What is the purpose of valve timing diagram ? What is meant by valve overlap and why is it provided for four-stroke IC engine ?

(8 marks)

(ii) Write short notes on Rating of SI engine fuels. (4 marks)

Turn over

2. (a) With the illustrative diagrams explain the following essential parts of a carburetor : —

(i) Float chamber.

(ii) Choke.

(iii) Metering system.

(iv) Accelerating system.

Or

(b) Explain the operation of Battery Ignition system for SI engines. Write short notes on Ignition timing and spark advance.

3. (a) Explain the stages of combustion in SI engines discussing about the flame front propagation.

Or

(b) Discuss in detail about the types of combustion chambers in SI engines.

4. (a) Explain the phenomenon of knock in CI engines.

Or

(b) Discuss in detail about the factors affecting the delay period in CI engine combustion.

5. (a) A four cylinder, four stroke gasoline engine has a bore of 60 mm and a stroke of 100 mm. On test it develops a torque of 66. 5 Nm when running at 3000 rpm. If the clearance volume in each cylinder is 60 cc and the relative efficiency with respect to brake thermal efficiency is 0.5 and the calorific value of the fuel is 42 MJ/kg, determine the fuel consumption in kg/hr and the brake mean effective pressure.

Or

(b) (i) What is the purpose of Morse test and explain how is it carried out ?

(6 marks)

(ii) Explain about the causes of hydrocarbon emissions from SI engines.

(6 marks)

[5 × 12 = 60 marks]

F 3598 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch : Mechanical Engineering / Automobile Engineering

PRINCIPLES OF MANAGEMENT AND ENGINEERING ECONOMICS (MU)

(Prior to 2007 admissions only)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

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

Part A (Principles of Management)

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

1. (a) What are the limitations of Planning ?

   (b) Define Span of management. Why is the span of management is limited ?

Or

2. (a) Analyse the Meaning, Merits and Limitations of Line and Staff Organisation.

   (b) What are the components of delegation ? Distinguish between Authority and Power.

3. (a) Explain Vroom's model of motivation.

   (b) How to develop High performed teams ?

Or

4. (a) Explain the stages of Group Development.

   (b) Define product. How can it be classified ? Distinguish between consumer and Industrial product.

5. (a) Distinguish between Private and Public Enterprises.

   (b) State the three concepts of wages. What are the chief features of time wage ? Point out the advantages of piece wage system.

Or

6. (a) What are the chief objects of Incentive System ? Explain the steps involved in determination of an individual's wage rate.

   (b) What is Total Quality Management ? Discuss the seven underlying principles of TQM.

Turn over

Part B (Engineering Economics)

7. (a) Define Demand. What are the factors determining demand ? Illustrate the Law of Demand. Why does demand curve slope upwards ? Give reason.

   (b) How Price is determined in a marker ?

Or

8. (a) State and explain the various National Income concepts and methods involved in National Income Accounting.

   (b) Define Tax. Explain the various cannons of Taxation.

9. (a) What are the salient features of Land ? Write a note on Quasi-rent.

   (b) Define inflation. What are the causes of inflation ? Suggest measures to control inflation.

Or

10. (a) Explain the Functions of RBI.

    (b) Illustrate the Credit Creation function by Commercial Banks.

11. (a) Discuss the functions and problems of Stock Market.

    (b) State and explain the institutional support provided by LIC to Industries.

Or

12. (a) Evaluate the functions performed by ICICI with special reference to Small Industries.

    (b) Analyse the role of MNCs and their economic impact in our country.

F 3607 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch : Mechanical Engineering

COMPUTER AIDED DESIGN AND MANUFACTURING (MU)

(Prior to 2007 admissions only)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Module 1

1. (a) What is computer aided design ? Discuss the various design related tasks performed by CAD. (10 marks)

(b) Discuss the reasons for implementing CAD and write the benefits of CAD. (10 marks)

Or

2. (a) Describe in detail about Bresenham's circle algorithm. (12 marks)

(b) Briefly explain the input devices of CAD. (8 marks)

Module 2

3. (a) Describe briefly the various elements of the Numerical Control system. (10 marks)

(b) Explain the typical applications and advantages of PLC. (10 marks)

Or

4. (a) Discuss the various parts of a PLC system with neat sketch. (12 marks)

(b) Explain the following in Numerical Control Systems : —

(i) Point to point.

(ii) Straight cut.

(iii) Contouring in NC. (8 marks)

Turn over

Module 3

5. (a) Describe briefly the coordinate system used in Numerical Control. (10 marks)

(b) Explain briefly the tape format available in punched tape. (10 marks)

Or

6. (a) What is computer-aided part programming ? Explain the various steps involved. (12 marks)

(b) What are the functions of CNC ? Explain briefly. (8 marks)

Module 4

7. (a) What is Computer aided process planning ? Explain the approaches used for CAPP systems. (12 marks)

(b) Explain the criteria for selecting a CAPP system. (8 marks)

Or

8. (a) Discuss the various implementation techniques in CAPP. (10 marks)

(b) Explain the coding structure used in the group technology. (10 marks)

Module 5

9. (a) Describe briefly the different elements of Robot system. (12 marks)

(b) Define robot and explain the need for using robots. (8 marks)

Or

10. (a) Explain the major functions of Robot programming system. (8 marks)

(b) Briefly describe the control systems in robot. (12 marks)

[5 × 20 = 100 marks]

F 3563 **(Pages : 3)** **Reg. No.....ME.....**

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch—Mechanical Engineering

MECHANICS OF MATERIALS (M)

(Prior to 2007 Admissions—Supplementary)

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

Part A

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

1. A mild-steel rod 20 mm diameter is subjected to an axial pull of 50 kN. Determine the tensile stress indicated in the rod and the elongation if the unloaded length is 5 m. E = 210 GN/m^2.
2. A cylindrical bar is 2 cm in diameter and 100 cm long. During a tensile test it is found that the longitudinal strain is 4 times the lateral strain. Calculate the modulus of rigidity and the bulk modulus if its elastic modulus is 100 GPa. Find the change in volume, when the basis subjected to a hydrostatic pressure of 100 MPa.
3. The stress components of a point are given by $\sigma_x = 20$, $\sigma_y = 10$, $\sigma_z = 15$, $\tau_{xy} = 5$, $\tau_{yz} = 10$, $\tau_{xz} = 20$ MPa. Calculate the strain components taking E = 200 GPa and Poisson's ratio = 0.25.
4. Write the significance of Shearless planes.
5. What is meant by axisymmetric problems ? Give examples.
6. Derive the expression of shear strain in Polar co-ordinates.
7. State Lame's theory. What are the assumptions made in the distribution of stresses in thick cylinders?
8. Write short notes on compound cylinders.
9. State the assumptions made in the Winkler Bach theory.
10. Write a short note on Photoelastic technique of study of stresses.

(10 × 4 = 40 marks)

Part B

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

1. The state of stress at a point is given by :

   $\sigma_x = 120$ MPa, $\sigma_y = 140$ MPa, $\sigma_z = 66$ MPa, $\tau_{xy} = 45$ MPa, $\tau_{yz} = 65$ MPa and $\tau_{zx} = 25$ MPa.

   Determine the three principle stresses.

(12 marks)

Or

Turn over

2. A tension bar is found to taper uniformly from (D-a) cm diameter to (D + a) cm. Prove that the error involved in using the mean diameter to calculate Young's modulus is $[10a/D]^2$ percent.

(12 marks)

3. At a point in a stressed material the Cartesian stress components are :

$\sigma_x = -40$ MPa, $\sigma_y = 80$ MPa, $\sigma_z = 120$ MPa, $\tau_{xy} = 72$MPa, $\tau_{yz} = 46$ MPa, $\tau_{xz} = 32$ MPa.

Calculate the normal, shear and resultant stresses on a plane whose normal makes an angle of 48° with the axis and 61° with the y-axis.

Or

4. The strain components at a point are given by $\varepsilon_x = 100$, $\varepsilon_y = 50$, $\varepsilon_z = 40$, μ-strains and $\gamma_{xy} = 20$, $\gamma_{yz} = 10$, $\gamma_{xz} = 15$ μ-radians. Calculate the normal and shearing strains on a plane whose normal has the direction cosines $1/\sqrt{3}, \sqrt{2/3}, 0$.

(12 marks)

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

Or

6. Derive the expressions for the stresses in a rotating disc. (12 marks)

7. (a) Prove that the maximum hoop stress in a thick cylinders is given by :

$$(\sigma_0)_{max} = P\left(\frac{k^2+1}{k^2-1}\right)$$

where p = internal pressure k = outside to inside diameter ratio.

(6 marks)

(b) If a cylinder of internal diameter d, wall thickness 't' subjected to an internal pressure only, is assumed to be thin cylinder, what is the greatest value for the ratio t/d if the error in the estimated maximum hoop stress is not to exceed 5 percent ?

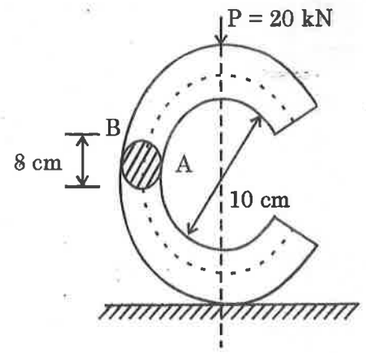
(6 marks)

Or

8. A gun metal cylinder 12 cm external diameter and 7.995 cm internal diameter is forced onto a steel cylinder 8 cm external diameter and 4 cm internal diameter. Calculate the maximum resulting stresses in steel and gun metal. $E_{steel} = 200$ GPa, $E_{gun\text{-}metal} = 100$ GPa. Poisson's ratio is 0.35 for both metals.

(12 marks)

9. A ring is made of stock with a circular cross-section 8 cm in diameter. The inside diameter of the ring is 10 cm. The load P is 20 kN. Calculate the stresses at A and B.



(12 marks)

Or

10. A steel ring 20 cm mean diameter has a rectangular cross-section 5 cm in the radial direction and 3 cm perpendicular to the radial direction. If the maximum tensile stress is limited to 120 MPa. Determine the tensile load that the ring can carry.

(12 marks)

[5 × 12 = 60 marks]

F 3589 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Sixth Semester

Branch : Mechanical Engineering / Automobile Engineering

HEAT AND MASS TRANSFER (MU)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

1. Explain heat conduction through a sphere.
2. Explain the terms thermal capacity and thermal diffusivity of a material.
3. Explain the physical meaning of Nusselt number.
4. What is meant by turbulent intensity ?
5. When do we use effectiveness-NTU method for design of heat exchangers ?
6. Write the expression for LMTD for counter flow heat exchanger.
7. Discuss briefly the electromagnetic wave spectrum.
8. Define the following : —
   (i) Irradiation.
   (ii) Radiosity.
9. Explain briefly about Mass transfer.
10. What is meant by Dropwise condensation ?

(10 × 4 = 40 marks)

Part B

11. A cold storage room has walls made of 0.23 m brick on the outside, 0.08 m of plastic foam and finally 1.5 cm of wood on the inside. The outside and inside air temperatures are 22°C and –2°C respectively. The inside and outside heat transfer coefficients are respectively 29 and 12 $W/m^2.K$. The thermal conductivities of brick, foam and wood are 0.98, 0.02 and 0.12 W/m.K. The thermal conductivities of brick, foam and wood are 0.98, 0.02 and 0.12 W/m.K respectively. Calculate the following : —
    (i) The rate of heat removal by refrigeration if the total wall area is 90 m^2.
    (ii) The inside surface temperature of the brick.

Or

12. Derive the general three-dimensional heat conduction equation in rectangular coordinates.

13. Engine oil at 100°C flows over a 5.5 m long flat plate whose temperature is 25°C. Calculate the total drag force and the rate of heat transfer per unit width of the entire plate for a flow velocity of 2 m/s. Assume the following properties :

$$P = 864\ kg/m^3,\ Pr = 1050,\ k = 0.14\ W/m.K,\ \upsilon = 84 \times 10^{-6}\ m^2/s$$

Or

14. Air at 20°C and 1 atmosphere pressure flows across a heated cylinder, 75 mm diameter with a velocity of 1.2 m/s. Calculate :

    (i) The heat transfer rate if the cylinder surface is maintained at a temperature of 100°C.

    (ii) The average temperature if a constrant heat flux of 1500 W/m^2 is supplied at the wall.

15. In a counter-flow double pipe heat exchanger ; water is heated from 25°C to 65°C by oil with a specific heat of 1.45 kJ/kg K and mass flow rate of 0.9 kg/sec. The oil is cooled from 230°C to 160°C. If the overall heat transfer coefficient is 420 W/m^2 °C, Calculate the following : —

    (i) The rate of heat transfer.

    (ii) The mass flow rate of water.

    (iii) The surface area of heat exchanger.

Or

16. Water at the rate of 4 kg/s is heated from 38°C to 55°C in a shell and tube type heat exchanger. The water is to flow inside tubes of 2 cm diameter with an average velocity of 35 cm/s. Hot water available at 95° C and at the rate of 2 kg/s is used as the heating medium on the shell side. If the length of tubes must not be more than 2 m, calculate the number of tube passes, the number of tubes per pass and the length of the tube for one pass shell, assuming $U_0 = 1500\ W/m^2K$.

17. (a) State Kirchoff 's law of thermal radiation.

(2 marks)

(b) A furnace can be approximated as a very long equilateral triangular duct. The hot wall is maintained at 900K and has an emissivity of 0.8. The cold wall is at 400K and has the same emissivity, while the third wall is a reradiating one. Neglecting the end effects, find the net radiation heat flux leaving the wall.

(10 marks)

Or

18. Determine heat lost by radiation per meter length of 80 mm diameter pipe at 300° C, if :

    (i) Located in a large room with red brick walls at a temperature of 27°C,

    (ii) Enclosed in a 160 mm diameter red brick conduit at a temperature of 27°C.

19. Water is boiled at the rate of 25 kg/hr in a polished copper pan, 280 mm in diameter, at atmospheric pressure. Assuming nucleate boiling conditions, calculate the temperature of the bottom surface of the pan.

Or

20. Derive the general mass transfer equation in Cartesian coordinates.

(5 × 12 = 60 marks)