Code: 4G564

III B.Tech. II Semester Regular Examinations May 2017
Applied Thermodynamics-III
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. Discuss the methods to improve the efficiency of gas turbine power plant

OR

2. A gas turbine plant has an overall pressure ratio of 5 and a maximum temperature of 550 C. The turbine drives the compressor and an electric alternator, with transmission efficiency of 97%. The ambient temperature is 20 C and isentropic efficiency of the compressor and turbine are 80 and 83%, respectively. Calculate the power input to alternator for an air flow rate of 15 kg/s. Also calculate the thermal efficiency and work ratio.

UNIT–II

3. With neat sketch explain the working of ideal vapour compression refrigeration system. Show the cycle on p-h and T-s diagrams

OR

4. An ideal vapour compression system uses R-12 as the refrigerant. The system uses an evaporation temperature of 0 C and a condenser temperature of 40 C. The capacity of the system is 7 TR. Determine
    (a) The mass flow rate of refrigerant,
    (b) Power required to run the compressor,
    (c) Heat rejected in the condenser,
    (d) COP of the system,
    Use the properties of R-12 from the table given below:

Temp. C	Pressure bar	h_f kJ/kg	h_g kJ/kg	s_f kJ/kg	s_g kJ/kg·K
0	3.087	36.05	187.53	0.142	0.696
40	9.609	74.59	203.2	0.727	0.682

Take C_p for superheated vapour as 0.6 kJ/kg·K.

UNIT–III

5. With the help of a neat sketch explain the working of LiBr-water absorption refrigeration system

OR

6. Discuss the merits and demerits of vapour absorption refrigeration system compared to vapour compression refrigeration system

UNIT–IV

7. Explain the construction of psychrometric chart

OR

8. The moist air is at a temperature of 20 C under a total pressure of   740 mm Hg. The dew point temperature is 15 C. Find
    (a) the partial pressure of water vapour,
    (b) the relative humidity,
    (c) the specific humidity,
    (d) the specific enthalpy of water vapour by three methods,
    (e) the enthalpy of air per kg of d.a., and
    (f) the specific volume of air per kg of d.a.

UNIT–V

9. List the types of air filters used in air conditioning and explain the working of centrifugal dust collector

OR

10. Explain the working of air to water heat pump circuit

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Code: 4G562

R-14

III B.Tech. II Semester Regular Examinations May 2017
CAD/CAM
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Describe the product cycle followed in a CAD/CAM system   7M

    b) What are the designs related tasks performed by modern computer? Explain with block diagram   7M

OR

2. a) What database structure is implemented for a graphics modeling?   7M

    b) What is a geometric transformation? Explain any three geometric 2-D transformations   7M

UNIT–II

3. a) Explain Hermite cubic spline curve with neat sketch. Also write its characteristics and obtain
        the parametric equation for the same.   7M

    b) Find the degree of Bezier curve controlled by three points (4, 2), (0, 0) and (2, 8). Also find
        the equation of the Bezier curve in parametric format with parameter '   '.   7M

OR

4. a) What is geometric modeling? Explain its importance in CAD / CAM applications. Discuss
        the different types of geometric modeling techniques.   8M

    b) A triangle ABC with vertices A(30,20), B(90,20) and C(30,80) is to be scaled by factor
        0.5 about a point X(50,40). Determine (i) the composition matrix and (ii) the coordinates
        of the vertices for a scaled triangle.   6M

UNIT–III

5. a) What do you understand by the term Numerical Control? Explain briefly the functions that are
        expected to be served by NC in machine tools.   7M

    b) Discuss the advantages and limitations of open loop and closed loop controls.   7M

OR

6. a) Explain the APT statements:
        i) GOTO and GO/TO ii) GODLTA and GOBACK and iii) INTOL and OUTTOL.   7M

    b) With a neat sketch explain the Structure of CNC machine tools   7M

UNIT–IV

7. a) How is tool life monitored in FMS? What are the major elements of FMS?   7M

    b) Discuss the principle and advantages of group technology coding.   7M

OR

8. a) Discuss how group technology is used in designing manufacturing cells.   7M

    b) Compare variant and generative process planning methodologies.   7M

UNIT–V

9. a) Discuss the important benefits of computer-aided quality control.   7M

    b) Describe the features of a flexible inspection system.   7M

OR

10. a) Explain the method of part inspection using a CMM.   7M

    b) What are the different material handling systems used in industry? Discuss in details.   7M

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Code: 4G565

III B.Tech. II Semester Regular Examinations May 2017
Design of Machine Elements-II
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Discuss the selection of bearing parameters in the design of Journal bearings. 4M

   b) Design a full hydrodynamic journal bearing with following specification for machine tool application: Journal diameter = 75 mm, radial load = 10 kN, Journal speed = 1440 rpm, Minimum oil film thickness = 22.5 microns, inlet temperature = 40^0C, bearing material = Babbitt. Determine the length of the bearing and select suitable oil for this application. 10M

OR

2. a) Explain briefly about the Static and Dynamic load carrying capacity of a Rolling contact bearing. 4M

   b) A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationery equivalent radial load of 3 kN for 10 percent of time, 2 kN for 20 percent of time,1 kN for 30 percent of time and no load for remaining time of cycle. If the total life expected for the bearing is 20 X10^6 revolutions at 95 % reliability, Calculate dynamic load rating of the ball bearing. 10M

UNIT–II

3. a) Explain the various types of crankshafts with neat sketches. 4M

   b) Design a Cast iron piston for a single acting four stroke engine for the following data : Cylinder bore=100 mm, Stroke=125 mm, Maximum gas pressure=5 N/mm^2, Indicated mean effective pressure=0.75 N/mm^2,Mechanical efficiency = 80 %, Fuel consumption = 0.15 kg per brake power per hour, Higher calorific value of fuel = 42X10^3 kJ/kg, Speed = 2000 rpm. Any other data required for the design may be assumed. 10M

OR

4. a) Explain the various stresses induced in the connecting rod. 4M

   b) Design a Connecting rod for a petrol engine from the following data :
   Diameter of piston 110 mm, Mass of reciprocating parts 2 kg, Length of connecting rod 325 mm, Stroke 150 mm, Speed 1500 rpm, with possible over speed upto 2500 rpm, Compression ratio 4:1,Maximum explosion pressure ,P_e = 2.5 MPa. 10M

UNIT–III

5. a) Discuss the materials and practical applications for the various types of springs. 4M

   b) A helical compression spring made of oil tempered carbon steel, is subjected to a load which varies from 400 N to 1000 N. The spring index is 6 and the design factor of safety is 1.25.If the yield stress in shear is 770 MPa and endurance stress in shear is 350 MPa, Find : 1.Size of the spring wire 2.Diameters of the spring 3.Number of turns of the spring and 4.Free length of the spring. The compression of the spring at the maximum load is 30 mm. The modulus of rigidity for the spring material may be taken as 80 kN/mm^2. 10M

OR

6. a) What are the advantages of V-belt drive over flat belt drive? 4M

   b) An open belt connects two flat pulleys. The pulley diameters are 300 mm and 450 mm and the corresponding angles of lap are 160^0 and 210^0.The smaller pulley runs at 200 rpm .The coefficient of friction between the belt and pulley is 0.25.It is found that the belt is on the point of slipping when 3 kW is transmitted. To increase the power transmitted two alternatives are suggested, namely (i) increasing the initial tension by 10%, and (ii) increasing the coefficient of friction by 10% by the application of a suitable dressing to the belt. Which of these two methods would be more effective? Find the percentage increase in power possible in each case. 10M

UNIT–IV

7. It is required to design a pair of spur gears with 20^0 full-depth involute teeth based on Lewis equation. The velocity factor is to be used to account for dynamic load. The pinion shaft is connected to a 10 kW, 1440 rpm motor. The starting torque of the motor is 150 % of the rated torque. The speed reduction is 4:1.The pinion as well as the gear is made of plain carbon steel 40C8 (S_{ut} = 600 N/mm^2).The factor of safety can be as 1.5.Design the gears, specify their dimensions and suggest suitable surface hardness for the gears.   14M

OR

8. A pair of helical gears are to transmit 15 kW. The teeth are 20^0 stub in diametral plane and have a helix angle of 45^0.The pinion runs at 10000 rpm and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa. Determine a suitable module and face width from static considerations and check the gears for wear, given $_{es}$ = 618 MPa.   14M

UNIT–V

9. a) Explain briefly about Compound and Differential screws in Power screws.   4M

   b) The lead screw of a lathe has single-start ISO metric trapezoidal threads of 52 mm nominal diameter and 8 mm pitch. The screw is required to exert an axial force of 2 kN in order to drive the tool carriage during turning operation. The thrust is carried on a collar of 100 mm outer diameter and 60 mm inner diameter. The values of coefficient of friction at the screw threads and the collar are 0.15 and 0.12 respectively. The lead screw rotates at 30 rpm. Determine :(i) the power required to drive the lead screw and (ii) the efficiency of the screw.   10M

OR

10. A hook carries a load of 7.5 kN and the load line is at a distance of 20 mm from the inner edge of the section which is trapezoidal. The load line also passes through the centre of curvature of the hook. The dimensions of the central horizontal trapezoidal section are : inner width = 30 mm, outer width = 15 mm, depth =30 mm. Determine the maximum and minimum stresses. Also plot the variation of stress across the section.   14M

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III B.Tech. II Semester Regular Examinations May 2017
Instrumentation and control systems
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Identify the various elements and point out the functions performed by each element in a generalized measurement system with block diagram   7M

   b) Define the term transducer? How these are classified? Explain their importance in an instrumentation process.   7M

OR

2. a) Explain the sources of errors in measurements and measuring instruments.   6M

   b) List the essential features of inductive and capacitive transducers used for the measurement of displacement.   8M

UNIT–II

3. a) Describe the principle of operation of a ionization gauge with neat sketch and mention its applications   7M

   b) Explain the working principle of a hot wire anemometer.   7M

OR

4. a) Explain the mechanism of a bourdon tube pressure gauge and explain how the tube functions. Mention the materials used for the tube   8M

   b) Explain how pyrometric cones are used for the measurement of temperature.   6M

UNIT–III

5. a) Distinguish between bonded and unbounded type of resistance strain gauge.   7M

   b) Describe the working principle of piezo electric transducer for the measurement of acceleration   7M

OR

6. a) Briefly explain the different methods of measurement of stain.   6M

   b) What is a proving ring? How is it used to measure force?   8M

UNIT–IV

7. a) How feedback can be used to reduce the effect of various spurious inputs in an instrumentation system   7M

   b) Explain Mason's rule as used for determining the overall transfer function from signal flow diagram   7M

OR

8. a) Distinguish between manual and automatic control systems and list some of the engineering applications where automatic control becomes obligatory.   6M

   b) The control system demonstrated in Fig. 1 is subjected to a disturbance D(s). Employ the principle of superposition to determine its effect on the output of the system.
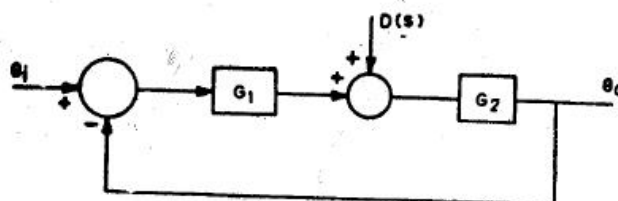

Fig. 1   8M

UNIT–V

9. a) State and explain Routh - Hurwitz stability criteria   6M

   b) Using Rouths criterion, determine the stability of a system whose characteristic equation is $S^5 + 2 S^4 + 10 S^3 + 20 S^2 + 5 S + 12 = 0$ 8M

OR

10. a) Compare gain margin and phase margin   6M

    b) A system has an open loop transfer function G (s). H(s) = $\frac{K}{s(s+0.2)(s+10)}$ Determine using Bode plots the value of K so that the system has:
       i. a gain margin of 40 db
       ii. a gain margin of 0 db (that is, system is having limited stability)   8M

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III B.Tech. II Semester Regular Examinations May 2017
Industrial Management
(Mechanical Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. Define Management and explain in detail, the evolution of management thought.   14M

OR

2. Discuss in detail, the basic concepts related to an organization.   14M

UNIT–II

3. Define a plant layout and explain the objectives and types of plant layouts.   14M

OR

4. Explain in detail, the components of Project Management.   14M

UNIT–III

5. Explain in detail, the concept, steps involved and the tools used for Method Study.   14M

OR

6. Define Work Sampling and explain in detail, the steps involved in work sampling.   14M

UNIT–IV

7. Explain in detail, the various techniques of inventory classification.   14M

OR

8. Explain in detail, the various techniques of statistical quality control.   14M

UNIT–V

9. Define HRM and examine the critical functions of HRM with specific reference to a manufacturing industry.   14M

OR

10. Explain in detail, with the help of an example, the concept of Product Life Cycle.   14M

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III B.Tech. II Semester Regular Examinations May 2017
Metrology and Surface Engineering
(Mechanical Engineering)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. Distinguish between hole basis system and shaft basis system? A hole and the mating shaft have nominal size of 50mm. The assembly is to have a maximum clearance of 0.15mm and minimum clearance of 0.05mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the size of hole and shaft is (**a**) The hole based system, (**b**) The shaft based system.　　14M

OR

2. Design the general type of Go and Not-Go gauge for checking the following fit (*30H7/f8*).Being given
    1. i(microns)$=0.45\sqrt[3]{D}+0.001D$ (D in mm)
    2. fundamental shaft deviation for f shaft=-5.5D$^{0.41}$
    3. 30mm falls in the diameter step of 18 and 30.
    4. IT7=16i, IT8=25i　　14M

UNIT–II

3. a) What is meant by the term flatness as applied to metrology?　　4M
   b) Sketch a line diagram of an N.P.L Gauge interferrometer, and illustrate the appearance of the field of view as seen in the eye piece.　　10M

OR

4. a) How we are measuring angles using universal bevel vernier protractor With a neat sketch.　　8M
   b) Indicate the minimum number angle gauges are required to obtain the following angles
       i. $24^0\,3'$
       ii. $32^0\,50'\,54"$
       iii. $110^0\,30'$　　6M

UNIT–III

5. a) Define the terms primary texture and secondary texture　　4M
   b) Determine the R_a index number of a surface for which the graph was drawn to a vertical magnification 15000 and a horizontal magnification of 100, and the areas above and below of the datum line were –
       above　160　　90　　180　　50 mm^2
       below　95　　65　　170　　150 mm^2　　10M

OR

6. a) How a comparator is different from measuring instrument?　　4M
   b) Explain with neat sketch working principle of pneumatic comparator　　10M

UNIT–IV

7. Define best wire size. Explain the measurement of effective diameter of screw thread using three wire method.　　14M

OR

8. Describe with sketches the applications of CMMs taking an example of work piece.　　14M

UNIT–V

9. Discuss with neatly drawn sketches the following tests on Lathe
    a) Spindle center run out
    b) Spindle taper bore run out.
    c) Chunk run out.
    d) Cross slide alignment.　　14M

OR

10. a) State the importance of Surface treatment processes and their characteristics and applications.　　6M
    b) Describe different types of Diffusion coatings　　8M

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