**Code: 4G565**

III B.Tech. II Semester Supplementary Examinations December 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)  Explain with reference to a neat plot the importance of the bearing characteristic curve.          4M

    b)  Following data is given for a $360^0$ hydrodynamic bearing :

    Radial load = 10Kn,Journal speed = 1440 rpm, Unit bearing pressure = 1000 kPa, clearance ratio (r/c) = 800,viscosity of lubricant = 30 m Pa s, Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Calculate : (i) dimensions of bearing (ii)coefficient of friction (iii) Power lost in friction (iv) total flow of oil (v) Side leakage and (vi) Temperature rise.          10M

**OR**

2.  a)  A single row deep groove ball bearing  No.6002 is subjected to an axial thrust of 1000 N and a radial load of 2200 N .Find the expected life that 50 % of the bearings will complete under this condition.          8M

    b)  Explain briefly about the selection of bearing from Manufacturer's catalogue.          6M

## UNIT–II

3.  a)  Discuss the  considerations in the design of Piston head.          4M

    b)  A four stroke diesel engine has the following specifications :

    Brake power = 5 kW, Speed = 1200 rpm, Indicated mean effective pressure = 0.35 $N/mm^2$, Mechanical efficiency = 80 %.Determine :1.bore and length of the cylinder 2.thickness of the cylinder head and 3.Size of studs for the cylinder head.          10M

**OR**

4.  a)  Explain briefly about the whipping stress induced in the connecting rod.          4M

    b)  Discuss briefly about the design procedure of a Connecting rod with a neat sketch.          10M

## UNIT–III

5.  a)  Explain the construction of Multi-leaf spring.          4M

    b)  A semi-elliptic leaf spring used for automobile suspension consists of three extra full-length leaves and 15 graduated –length leaves, including the master leaf. The centre to centre distance between two eyes of the spring is 1 m. The maximum force that can act on the spring is 75 kN. For each leaf, the ratio of width to thickness is 9:1.The modulus of elasticity of the material is 207000 $N/mm^2$.The leaves are pre-stressed in such a way that when the force is maximum, the stresses induced in all leaves are same and equal to 450 $N/mm^2$.Determine : (i) the width and thickness of the leaves (ii) the initial nip and (iii) the initial pre-load required to close the gap C between extra-full length leaves and graduated-length leaves.          10M

**OR**

6.  It is required to select a V-belt drive for 5 kW normal torque motor, which runs at 1440 rpm to a light duty compressor running at 970 rpm. The compressor runs for 24 hr per day. Space is available for a centre distance of about 500 mm. Assume that the pitch diameter of driving pulley is 150 mm.          14M

**UNIT–IV**

7. A steel pinion with $20^0$ full depth involute teeth is transmitting 7.5 Kw power at 1000 rpm from an electric motor. The starting torque of the motor is twice the rated torque. The number of teeth on the pinion is 25, while the module is 4 mm. The face width is 45 mm. Assuming that velocity factor accounts for the dynamic load, Calculate (i) the effective load on the gear tooth and (ii) the bending stresses in the gear tooth.     14M

**OR**

8) a) Explain the following terms used in helical gears:

(i) Helix angle (ii) normal pitch and (iii) axial pitch     3M

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is $20^0$, while the helix angle is $25^0$. The face width is 40 mm and the normal module is 4 mm. The pinion as well as the gear is made of steel 40C8($S_{ut}$ = 600 N/mm$^2$) and heat treated to a surface hardness of 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and Calculate the power transmitting capacity of gears.     11M

**UNIT–V**

9. a) What are the advantages of the Power screws?     4M

b) A double-threaded power screw, with ISO metric trapezoidal threads, is used to raise a load of 300 kN. The nominal diameter is 100 mm and the pitch is 12 mm. The coefficient of friction at screw threads is 0.15.Neglecting collar friction, Calculate : (i) torque required to raise the load (ii) torque required to lower the load and (iii) efficiency of the screw.     10M

**OR**

10. a) Find an expression for $h^2$ for rectangular section.     4M

b) Determine: (i) position of neutral axis and (ii) maximum and minimum stresses when a curved beam of circular section of diameter 100 mm is subjected to pure bending moment of +11.5 kNm. The radius of curvature is 100 mm.     10M

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**Code: 4G561**

**R-14**

III B.Tech. II Semester Supplementary Examinations December 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)  Explain different dynamic characteristics of an instrument.                                    6M

    b)  Explain the principle of operation of linear variable differential transformer. Identify the input and output of the system with typical graph.                                    8M

**OR**

2.  a)  Define the term calibration? Why it is necessary for instrumentation. Explain                  6M

    b)  Describe the principle of operation of a piezo electric transducer. Identify the input and output of the system with typical graph.                                    8M

### UNIT–II

3.  a)  Explain absolute, gauge and vacuum pressures                                    6M

    b)  Describe the flow measurement method using ultrasonic flow meter                              8M

**OR**

4.  a)  Explain with a neat sketch the constructional features and working principle of a Mcleod pressure gauge.                                    7M

    b)  Compare the thermocouples and thermisters                                    7M

### UNIT–III

5.  a)  Define gauge factor? Derive the relation between gauge factor and passion ratio?              7M

    b)  Explain the measurement of vibration by reed type vibrometer. Mention its advantages and disadvantages.                                    7M

**OR**

6.  a)  What is a strain rosette and how it is used for the measurement of strains                    7M

    b)  Describe the working of a hydraulic load cell for the measurement of force.                    7M

### UNIT–IV

7.  a)  Distinguish between open loop and close loop control systems with suitable diagrams           6M

    b)  Define a system. Compare physical model and mathematical model related to the control system.  8M

**OR**

8.  a)  What is servo mechanism? Explain how it is used in control system with suitable example       6M

    b)  Determine the closed loop transfer function $_o(s) / {}_i(s)$ for the control system whose signal flow diagram is given in Fig. 1.



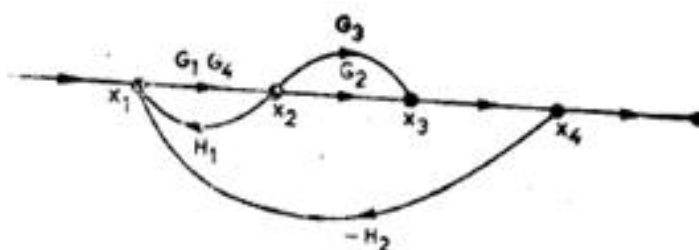Fig. 1                                    8M

### UNIT–V

9.  a)  What is mean by standard test signal? Explain various test signals.                           6M

    b)  Determine the value of K using Rouths criterion such that the system is stable. Characteristic equation is $2 S^4 + 4 S^3 + 6 S^2 + S + K = 0$                                    8M

**OR**

10. a)  What is transient response? Mention its properties?                                    6M

    b)  Plot the Bode plots for a unity feedback control system with a forward function:

    $$G(s) = \frac{150\,(s+2)}{s(s+1)(s+10)}$$

    Discuss the stability of the system by determining gain margin and phase margin.                  8M

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III B.Tech. II Semester Supplementary Examinations December 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.  Explain the administrative theory of management with specific reference to Henri Fayol.                                                                          14M

**OR**

2.  Explain in detail, various organic and mechanistic organizational structures.        14M

## UNIT–II

3.  Explain the factors of selecting a plant location with specific reference to rural and urban sites.                                                                      14M

**OR**

4.  Compare and contrast CPM and PERT and explain their importance in project management.                                                                          14M

## UNIT–III

5.  Explain in detail, the concept and steps involved in Work Study.                  14M

**OR**

6.  Explain the concept and different methods of performance rating.                  14M

## UNIT–IV

7.  Explain in detail, the objectives and functions of Inventory Management.          14M

**OR**

8.  Define and explain in detail, the concept of TQM.                                14M

## UNIT–V

9.  Define Job Evaluation and explain in detail the different types of evaluation methods.                                                                        14M

**OR**

10. Define Merit Rating and explain in detail, the various methods of merit rating.      14M

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III B.Tech. II Semester Supplementary Examinations December 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.  Differentiate between allowance and tolerance. Between two mating parts of 100mm basic size, the interference fit is used with the interferences of 0.05mm and 0.12mm.the tolerance on the hole is the same as the tolerance on the shaft. Find the size of hole and shaft is (a) Hole based system and (b) Shaft based system                                                                                   14M

**OR**

2.  Using a gauge maker's tolerance of ten percentage of the component tolerance calculate limits of size for the inspection and general gauges to check the fit,25 mm *H8f7*.
    The limits of size for the hole are:
    Low limit of size=25.000mm
    High limit of size=25.03mm
    The limit of size of the shaft are :
    Low limit of size=24.939mm
    High limit of size=24.980mm                                                              14M

### UNIT–II

3.  a)  Explain the method of measuring angles using following
        i.   Spirit level
        ii.  Sine bar.                                                                         8M
    b)  Explain why it is not preferred to use a signbar for measuring angles larger then $45^0$?                                                                                   6M

**OR**

4.  a)  Define the following terms
        i.   Straightness
        ii.  Flatness                                                                          6M
    b)  Explain method of measuring flatness using optical flats                           8M

### UNIT–III

5.  What are the differences between surface roughness and surface waviness? Measurement of surface roughness heights of 20 successive peaks and troughs were measured from a datum and were:
    35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns. if these measurements were obtained over a length of 20 mm, determine C.L.A and R.M.S values of the rough surface.                                    14M

**OR**

6.  Explain the working of sigma comparator. How will you distinguish between mechanical and optical-mechanical comparators?                                        14M

### UNIT–IV

7.  Explain the measurement of effective diameter of screw thread using
        i.   Thread micrometer
        ii.  Two wire method                                                                 14M

**OR**

8.  Explain the measurement of gear tooth thickness using gear tooth vernier caliper. and how do you determine the pitch error of a spur gear                      14M

### UNIT–V

9.  Explain the following alignment tests on Lathe
        i.   True running of head stock centre
        ii.  True running of locating cylinder of main spindle                              14M

**OR**

10. List out various diffusion coating process and explain them in detail.                 14M
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III B.Tech. II Semester Supplementary Examinations December 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. Explain the working of turbojet with neat sketch

**OR**

2. A gas turbine takes in air at 27 C and 1 bar. The pressure ratio is 4. The maximum temperature of the cycle is 560 C. The efficiencies of the compressor and turbine are 0.83 and 0.85 respectively. Find the overall efficiency, if the regenerator effectiveness is 0.75

### UNIT–II

3. Discuss the effect of evaporator pressure, condenser pressure, sub cooling and super heating on the performance of vapour compression refrigerator system

**OR**

4. A Bell Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from cold chamber at 9 C, compressed and then it is cooled to 29 C before entering the expansion cylinder. Expansion and compression follow the law $pV^{1.35} = C$. Calculate the theoretical power of the plant.

### UNIT–III

5. Explain the working of Ammonia water absorption refrigeration system with a neat sketch

**OR**

6. With the help of a neat sketch explain the working of Electrolux refrigerator

### UNIT–IV

7. Define
    a) DPT
    b) Wet bulb depression
    c) Relative humidity
    d) Specific humidity
    e) degree of saturation

**OR**

8. With a neat sketch explain summer air conditioning system

### UNIT–V

9. Explain working of any two types of dehumidifiers

**OR**

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

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III B.Tech. II Semester Supplementary Examinations December 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) Briefly describe the different techniques used for scan conversion in Computer Graphics.  7M

    b) Describe an algorithm for the removal of hidden lines.  7M

**OR**

2.  a) Compare the relative merits and demerits of different input devices.  6M

    b) A rectangle has corner co-ordinates (10,20) (40,20), (40,40), (10,40). This rectangle is rotated by 30° anticlockwise about (i) origin and (ii) about the point (40,20). Compute the new co-ordinates in both cases.  8M

### UNIT–II

3.  a) Explain B-Rep and C-rep approaches of solid modeling in detail.  6M

    b) The coordinates of a triangle are P(50, 20), Q(110, 20) and R(80, 60). Determine the coordinates of the vertices for the new reflected triangle, if it is to be reflected about
    (i) X – axis
    (ii) Line y = x  8M

**OR**

4.  a) What is the need for concatenation of transformations? Explain what care should be taken in such cases.  6M

    b) Describe briefly the following methods of surface modeling with a few application examples:
    i. Revsurf
    ii. Tabcyl
    iii. Bicubic surface
    iv. Bezier surface  8M

### UNIT–III

5.  a) What are the basic components of NC system? Explain the function of each component.  7M

    b) Sketch and explain DNC system.  7M

**OR**

6.  a) Discuss the CNC and Manual part programming methods.  6M

    b) Write the NC part programming using G, M and N codes for the following turning operation: Work material – Aluminium, Blank length = 125 mm, diameter =30 mm and depth of cut = 0 to 5 mm
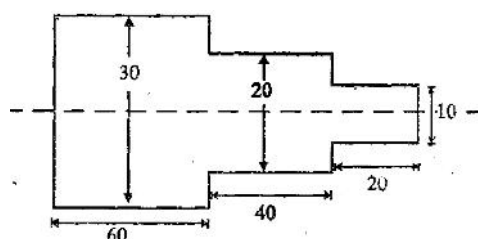


(All dimensions are in mm)  8M

### UNIT–IV

7. a) Discuss the importance of materials handling system in FMS.                7M

   b) Discuss the principle of variant process planning.                7M

**OR**

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

   b) Sketch the layout of a typical FMS and explain the important subsystems.                7M

### UNIT–V

9. a) What are the important sub-modules of a materials requirements planning software?                7M

   b) Explain CIM integration of all activities of industry                7M

**OR**

10. a) Discuss with neat sketches, the working principle of computer vision systems?                7M

    b) Discuss the major non-contact inspection methods.                7M

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