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**Code : 1G561**

III B.Tech. II Semester Regular &amp; Supplementary Examinations May 2016

**Instrumentation and Control Systems**

( Mechanical Engineering )

**Max. Marks: 70****Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Describe the generalized measurement system?  
b) State and explain the desirable static and dynamic characteristics of measuring instruments.
2. a) Explain with a neat sketch the constructional features and working principle of McLeod gauge used for the measuring of low pressure.  
b) Explain the working principle of resistance pressure gauge.
3. a) Explain the usage of hot wire anemometer in flow measurement. Enumerate the principle of operation and its limitations.  
b) Distinguish between RTD and thermistors.
4. a) What are load cells? Name the application of load cells?  
b) How seismic instruments are used for measuring acceleration? Explain in detail.
5. a) Differentiate between bonded and unbonded strain gauges.  
b) Describe the properties of materials used for strain gauges.  
c) List out various types of strain gauges for different applications.
6. a) Explain different types of control systems with block diagrams.  
b) Write the differential equations governing the behavior of the mechanical system shown in Figure 1

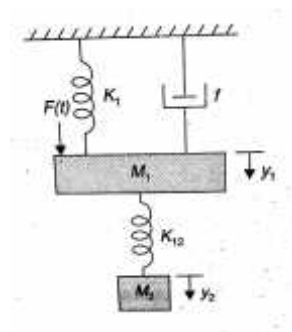


Figure 1

7. a) Briefly explain the first order & second order control systems with neat sketch?  
b) Write the time domain specifications
8. a) Briefly explain the necessary conditions for stability?  
b) The characteristic equation of system is  $s^2 - (K+2)s + (2K+5) = 0$ . Find the values of  $K$  for which the system is (i) Stable (ii) Limitedly stable (iii) Un stable.

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Hall Ticket Number :

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**R-11/R-13**

**Code : 1G562**

III B.Tech. II Semester Regular & Supplementary Examinations May 2016

**CAD/CAM**

( Mechanical Engineering )

**Max. Marks: 70**

**Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) What is product cycle? Explain the product cycle revised with CAD/CAM overlaid. 8M  
b) Discuss the various types of graphics terminals available in the CAD system 6M
2. With the aid of a suitable diagram, discuss the software configuration of a graphics system. 14M
3. A triangle is defined by its end parts (0, 2), (0, 3) and (1, 2) in a 2-D graphics system. Perform the following transformations on this triangle:
  - a) Translate the triangle in the space by 2 units in X-direction and 5 units in Y-direction.
  - b) Scale the original triangle by a factor of 1.5.
  - c) Scale the original triangle by a factor of 1.5 in X-direction and 3 in Y-direction.
  - d) Rotate the original triangle by 45° about the origin. 14M
4. a) Explain, with neat sketches, the NC motion control systems. 8M  
b) What is fixed zero and floating zero? 3M  
c) What is absolute positioning and incremental positioning? 3M
5. a) Define process planning. Explain, with a neat diagram, the concept of retrieval CAPP 7M  
b) Discuss the various methods of grouping parts into families. List the benefits of GT. 7M
6. a) Write a note on JIT. 6M  
b) What do you understand by AGVS? Classify them. 8M
7. a) Discuss the problems associated with traditional production planning and control 7M  
b) What is MRP? Explain the basic MRP concepts 7M
8. a) What are the objectives of computer-aided quality control? Spread a light over the contact inspection methods in quality testing. 7M  
b) Discuss the integration of computer aided quality control with CAD/CAM. 7M

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III B.Tech. II Semester Regular &amp; Supplementary Examinations May 2016

**Metrology and Surface Engineering**

( Mechanical Engineering )

**Max. Marks: 70****Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) A shaft must meet a design requirement of being at least 28.0 mm in diameter, but it can be 0.380 mm oversized. Express the shaft's tolerance, as it would appear on an engineering drawing. 7M
- b) Differentiate between Hole basis and Shaft basis system with aid of sketches. 7M
2. a) Obtain a digital micrometer and a steel ball of, say, 6-mm diameter. Measure the diameter of the ball when it (i) has been placed in a freezer, (ii) has been put into boiling Water, and (iii) when it has been held in your hand for different lengths of time. Note the variations, if any, of measured dimensions, and comment on them. 7M
- b) Determine the size of 'Go' and 'NO GO' gauges for components having 30 H7/f8 fit. Being given with usual notations.  $i$  (microns) =  $0.45 \sqrt[3]{D} + 0.001 D$  (D in mm). The upper deviation for shaft =  $-5.5.D^{0.41}$ , 30 mm falls in the diameter step of 18 and 30. 7M
3. a) Explain the principle of laser interferometer with neat sketch. 7M
- b) How will you measure diameter of a cylindrical plug gauge with the help of a given standard slip gauge and an optical flat? Also show a sample of calculations giving the height 'D' of plug gauge. 7M
4. a) In the measurement of roughness the heights of 16 successive peaks and troughs were measured from a datum and are 18, 24, 25, 35, 22, 36, 18, 42, 22, 32, 24, 36, 16, 38, 23, 4 microns. If the measurements were obtained over a length of 30mm, determine the following Values. 7M
  - (i) Ra
  - (ii) Rz
  - (iii) R.M.S
- b) Explain why identical surface-roughness values do not necessarily represent the same type of surface. 7M
5. a) What are the different elements of a Screw Thread? Enlist the instruments used for the measurement of the elements of screw thread. 7M
- b) Explain the working principle and usage of thread gauges? 7M
6. a) What is meant by an Alignment tests on machine tools and why they are necessary? 7M
- b) Explain the alignment test for drilling machine? 7M
7. a) Why have coordinate measuring machines become important instruments? 7M
- b) Discuss the merits and demerits of Parkinson's Gear tester with line diagram 7M
8. a) Give examples of part designs that are suitable for hot-dip galvanizing. 7M
- b) It is well known that coatings may be removed or depleted during the service life of components, particularly at elevated temperatures. Describe the factors involved in the strength and durability of coatings. 7M



Code : 1G564

III B.Tech. II Semester Regular &amp; Supplementary Examinations May 2016

**Thermal Engineering-III**

( Mechanical Engineering)

**Max. Marks: 70****Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Explain the working of Open cycle Gas Turbine and draw P-V and T-S diagrams 7M  
 b) In an open cycle gas turbine plant the air is compressed through a pressure ratio of 6 from  $20^{\circ}\text{C}$ . It is then heated to the max temperature of  $750^{\circ}\text{C}$  and expanded to the atmospheric pressure. The isentropic efficiencies of compressor and turbine are 80 % and 85 % respectively. Calculate the cycle efficiency and work output per kg of air. 7M
- 2 A turbo jet engine consumes air at the rate of 60 kg/s when flying at a speed of 1000 km/h. calculate:  
 i) Exit velocity of the jet when the enthalpy change for the nozzle is 230 kJ/kg and velocity coefficient is 0.96.  
 ii) Thrust specific fuel consumption  
 iii) Fuel flow rate in kg/s when air fuel ratio is 70:1  
 iv) Thermal efficiency of plant when the combustion efficiency is 92% and C.V of fuel is 42000kJ/kg  
 v) Propulsive power 14M
- 3 a) Give the differences between open and dense air refrigeration system. 4M  
 b) A Bell - Coleman cycle works between 1 and 6 bar pressure limits. The compression and expansion indices are 1.25 and 1.3 respectively. Obtain COP and tonnage of the Unit for an air flow rate of 0.5 kg/s. Neglect clearance volume and take temperature at the beginning of compression and expansion to be  $7^{\circ}\text{C}$  and  $37^{\circ}\text{C}$ , respectively 10M
4. a) Explain why throttle valve is used instead of and expansion cylinder in Vapour Compression Refrigeration systems. 4M  
 b) A refrigerating machine using F-12 as working fluid works between  $18^{\circ}\text{C}$  and  $37^{\circ}\text{C}$ . The enthalpy of liquid at  $37^{\circ}\text{C}$  is 455kJ/kg. The enthalpies of F-12 entering and leaving the compressor are 563kJ/kg and 595kJ/kg respectively. The mass flow rate is 2 kg/min and the efficiency of compressor is 0.85. Determine (i) capacity of the plant (ii) Compressor power (iii) COP of the plant. 10M
- 5 a) What is the function of analyzer in an absorption refrigeration system? 4M  
 b) Draw a neat line diagram of Electrolux refrigerator and explain its working principle. 10M
- 6 a) Explain the followings  
 i) WBT ii) Dew point depression iii) Humidity ratio iv) Absolute humidity 8M  
 b) A stream of air has the dry bulb temperature= $28^{\circ}\text{C}$  and moisture=0.016 kg/kg of dry air. Determine i) relative humidity: ii) dew point and iii) specific enthalpy of the moist air stream, if the barometer reads 760 mmHg. 6M
7. a) List out the different types of dehumidifiers and explain in detail one of them. 7M  
 b) Draw the 'air to air heat pump' circuit and explain its working. 7M
8. a) Explain the concept of 'effective temperature' in air conditioning design and discuss on what factors does it depend on. 7M  
 b) With the help of a neat sketch explain the working of Year round A/C system. 7M

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**Code : 1G565****R-11 / R-13**

III B.Tech. II Semester Regular &amp; Supplementary Examinations May 2016

**Design of Machine Elements-II***( Mechanical Engineering )***Max. Marks: 70****Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) What are journal bearings? Give a classification of these bearings. 3M  
 b) Design a journal bearing for a centrifugal pump running at 1400 rpm. The diameter of the journal is 100mm and load on each bearing is 20kN. The factor  $ZN/P$  may be taken as 28 for centrifugal pump bearings. The bearing is running at  $75^{\circ}\text{C}$  temperature and the atmospheric temperature is  $30^{\circ}\text{C}$ . The energy dissipation coefficient is  $875\text{W/m}^2/^{\circ}\text{C}$ . Take diametral clearance as 0.1mm. 11M
2. Design a trunk type piston for a single cylinder four stroke diesel engine running at 1000 RPM. 14M
3. Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of  $3.15\text{N/mm}^2$ . The diameter of the piston is 100 mm; mass of the reciprocating parts per cylinder 2.25kg; length of connecting rod 380mm; stroke of piston 190mm and compression ratio 6:1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as  $10\text{ N/mm}^2$  and  $5\text{N/mm}^2$ . The density of material of the rod may be taken as  $8000\text{kg/m}^3$  and the allowable stress in the bolts as  $60\text{ N/mm}^2$  and in cap as  $80\text{N/mm}^2$ . The rod is to be of I-section for which you can choose your own proportions. 14M
4. Write down the detail procedure for the design of crane hook of triangular section for a given load. 14M
5. a) Briefly explain the design procedure for flat belt. 4M  
 b) A flat belt, 8 mm thick and 100 mm wide transmits power between two pulleys, running at 1600 m/min. The mass of the belt is 0.9 kg/m length. The angle of lap in the smaller pulley is  $165^{\circ}$  and the coefficient of friction between the belt and the pulley is 0.3. If the maximum permissible stress in the belt is  $2\text{ MN/m}^2$ , find (i) Maximum power transmitted, and (ii) Initial tension in the belt 10M
6. a) What is backlash in gears? 2M  
 b) In a spur gear drive the diameter of pinion is 80 mm and the centre distance 160 mm. the power to be transmitted is 4.5KW at 800 rpm of pinion. Using  $20^{\circ}$  full depth teeth and material for pinion a steel with permissible static stress of 200 MPa, and for gear a steel with permissible static bending stress of 150 MPa. Determine the necessary module and face width of the teeth using lewis equation. 12M
7. a) What is the significance of Wahl's Factor? 2M  
 b) The mean diameter of a helical torsion spring is 40 mm. The torque applied on the spring is 70 N-m. The spring index is 8, and the number of coils is 10. The permissible stress in the spring is 400MPa, and  $E = 2 \times 10^5\text{ MPa}$ . Determine the diameter of the wire and deflection under the torque. 12M
8. A power screw having double start square threads of 25 mm nominal diameter and 5 mm pitch is acted upon by an axial load of 10KN. The outer and inner diameters of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 r.p.m. Assuming uniform wear condition at the collar and allowable thread bearing pressure of  $5.8\text{ N/mm}^2$ , find; 1. The torque required to rotate the screw, 2. The stress in the screw and 3. The number of threads of nut in engagement with screw. 14M

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Hall Ticket Number :

R-11/R-13

Code : 1G566

III B.Tech. II Semester Regular &amp; Supplementary Examinations May 2016

**Industrial Management**

( Mechanical Engineering )

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Distinguish between Theory X and Theory Y 7M  
b) Explain functions of Management 7M
2. a) Explain Line and Staff organization with their merits and demerits 7M  
b) Write short notes on virtual organization 7M
3. a) Compare between rural and urban site 7M  
b) Explain various types of plant layouts 7M
4. a) Describe different methods of performance rating 7M  
b) Differentiate between micro motion and memo motion study 7M
5. a) Explain various inventory classification techniques 7M  
b) State the objectives of inventory control 7M
6. a) Define i) event, ii) activity iii) float iv) critical path 4M  
b) Consider a project having seven activities with the following precedence relationship:

Activity	Immediate precedence	Duration(days)
A	-	6
B	-	4
C	A	3
D	A	4
E	B,C	7
F	D,E	5
G	E	10

- i) Draw the project network.
  - ii) Find the critical path
  - iii) Find the project completion time. 10M
- 7 a) Explain ISO 9000 series procedures 7M  
b) In a steel industry, forged components were inspected regularly for 10 days for detecting surface irregularities. All the relevant data are given below. Inspect batch size=300. The defective pieces from 1<sup>st</sup> to 10<sup>th</sup> are, 27, 30, 35, 40, 45, 59, 39, 36, 21 and 51 respectively. Compute the control limits and depicts the readings on a P-control chart. 7M
- 8 a) Describe the functions of HRM 7M  
b) Explain various wage incentive schemes 7M

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