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**Code : 1G561**

III B.Tech. II Semester Supplementary Examinations Nov/Dec 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) Explain the working of LVDT by means of neat sketches?  
b) What do you mean by instrumentation? Write the objective of instrumentation?
2. a) Define the following,  
i. Absolute pressure  
ii. Gauge pressure  
iii. Vacuum pressure  
b) Describe with a neat sketch the principle of working of Ionization Gauge?
3. a) With a neat sketch, explain the operation of a magnetic flow meter?  
b) Name the material of which thermistors are made and explain the working of thermistors in the act of temperature measurement?
4. a) How is hydraulic cell used for force measurement? Explain?  
b) Explain working of different types of torsion meters?
5. a) What is a strain gauge? Classify different types of electrical resistance strain gauges?  
b) Describe the properties of material used for strain gauges?
6. a) Explain with neat block diagram of closed loop positioned system?  
b) Describe the operation of a driver driving an automobile on the road and identify the components, input and output of the human system?
7. a) What are the standard test signals? Give their representation in mathematically and graphically.  
b) Measurements conducted on a servomechanism show the system response to be  $c(t) = 1 + 0.2 e^{-60t} - 1.2 e^{-10t}$  when subjected to a unit step input. Obtain the expression for closed loop transfer function.
8. a) Write the types of stabilities and explain any one with neat sketch?  
b) A feedback control system has an open loop transfer function

$$G(s)H(s) = \frac{K}{s(s+3)(s^2+2s+2)}$$

Find the root locus as K is varied 0 to

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III B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**CAD/CAM**

( Mechanical Engineering )

**Max. Marks: 70**

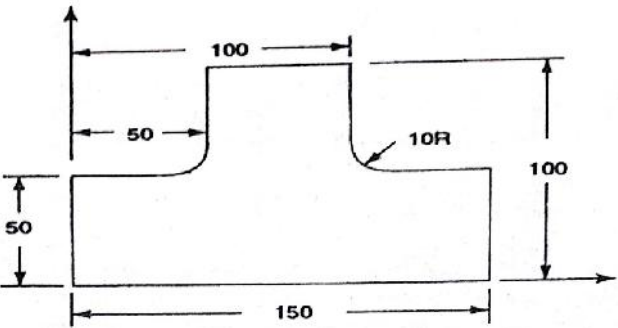
**Time: 03 Hours**

Answer any five questions

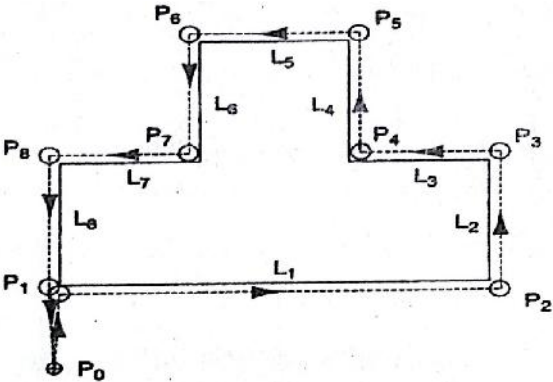
All Questions carry equal marks (14 Marks each)

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1. a) Discuss the applications of computers to the design process 7M  
 b) Explain, with suitable diagrams, the basic image generation techniques used in computer graphics terminals. 7M
2. List and explain the functions of a graphics package 14M
3. A line is defined by its end points (0, 0) and (2, 3) in a 2-D graphics system. Perform the following transformations on this line:  
 a) Scale the line by a factor of 2.0.  
 b) Scale the original line by a factor of 3.0 in X-direction and 3.0 in Y-direction.  
 c) Translate the original line by 2.0 units in X-direction and 2.0 units in Y-direction.  
 d) Rotate the original line by 45° about the origin. 14M
4. a) Define NC. What are the basic components of an NC system? 6M  
 b) Write a part program using APT for a component shown in Fig. 1. Fig. 2 shows the cutter path.



**Fig-1**



**Fig-2**

5. a) Define GT. Explain the composite part concept of part families. 7M  
 b) Spread a light over the role of computers in process planning. Discuss generative CAPP 7M
6. a) Write a note on human labour in manufacturing system. 7M  
 b) What do you understand by FMS? What are the components of FMS? 7M
7. a) What is shop floor control? Discuss the functions of shop floor control. 7M  
 b) What do you mean by MRP II? Discuss the four steps of MRP II. 7M
8. a) What is quality control? Discuss the role of computers in quality control. 7M  
 b) Explain, with a neat sketch, the operation of scanning laser beam system. 7M

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III B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Design of Machine Elements-II**

( Mechanical Engineering )

**Max. Marks: 70****Time: 3 Hours**Answer any **five** questions

All Questions carry equal marks (14 Marks each)

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1. a) What is meant by hydrodynamic lubrication? 3M  
 b) A journal bearing 0.075m long on a 0.0025m shaft supports a load of 2700N. The bearing has clearance of 0.05mm and the viscosity of the oil used is 0.027kg/ms at the operating temperature. If the bearing capable of dissipating  $150\text{W/m}^2/^{\circ}\text{C}$ , determine the maximum speed of rotation. 11M
2. Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100mm: Stroke = 125mm: Maximum gas pressure =  $5\text{N/mm}^2$ ; Indicated mean effective pressure =  $0.75\text{ N/mm}^2$  : Mechanical efficiency = 80%: Fuel consumption = 0.15 kg per brake power per hour : Higher calorific value of fuel =  $42 \times 10^3\text{ KJ/kg}$  : Speed = 2000 r.p.m. Any other data required for the design may be assumed. 14M
3. The following data refer to a 4-stroke single cylinder vertical engine: Piston diameter = 140mm, Stroke=180mm, Speed of the engine=1400r.p.m, Weight of the reciprocating parts = 50N, Design stress for the material used =  $90\text{N/mm}^2$ , Design bearing stress= $10\text{N/mm}^2$ , Design stress for bolts= $40\text{N/mm}^2$ . Design a suitable connecting rod and check for stresses due to inertia. 14M
4. Design a crane hook with the useful load lifting capacity of the crane as 50KW. The weight of the hook with grabbing tongs is 10KN. 14M
5. a) What are the advantages and disadvantages of V-belt drive over flat belt drive? 4M  
 b) A flat belt drive is required to transmit 10KW from a motor running at 1000rpm. The belt is 15mm thick and has mass density of  $0.001\text{ gm/mm}^3$ . Permissible tensile stress for the belt material is  $2.5\text{ N/mm}^2$ . Diameter of the driving pulley is 250mm where as speed of driven pulley is 367 rpm. Driving and driven shafts are 1.75m apart. The coefficient of friction between belt and pulley may be taken as 0.25. Determine width of the belt for safe working. 10M
6. a) If 50mm gear have 32 teeth what is the module of the gear? 2M  
 b) A pair of Spur gears is to transmit 20KW when the pinion rotates at 300 rpm. The velocity ratio is 1:3. The allowable static stresses for the pinion and gear are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and it's face width is 14 times the module. Determine i) module ii) face width and iii) pitch circle diameters for both pinion and gears. 12M
7. A helical compression spring made of oil tempered carbon steel, is subjected to a load which varies from 400N to 1000N. 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  
 a) Size of the spring wire  
 b) Diameter of the Spring  
 c) Free length of the spring 14M
8. The lead screw of a lathe has ACME threads 50mm outside diameter and 8mm pitch. The screw must exert an axial pressure of 2200 N in order to drive the tool carriage. The thrust is carried on a collar 100 mm outside diameter and 50 mm inside diameter and the screw rotates at 40 rpm. Determine:  
 (a) The power required to drive the screw and  
 (b) The efficiency of the lead screw. Assume a coefficient of friction of 0.16 for the screw and 0.14 for the collar. 14M

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Code : 1G566

III B.Tech. II Semester Supplementary Examinations Nov/Dec 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) Explain Taylor's scientific management 7M  
b) Describe Maslow's Hierarchy of human needs 7M
2. a) Describe functional organization with their merits and demerits 7M  
b) Write short notes on i)cellular organization ii)matrix organization 7M
3. a) Explain various factors for selection of a plant location 7M  
b) Explain from to chart and REL chart used in plant layout 7M
4. a) Describe various method study techniques 7M  
b) Write short notes on i)work sampling ii)time study 7M
5. a) Explain various inventory costs and derive an equation for EOQ for classic inventory model 7M  
b) Describe the duties of purchase manager 7M
6. a) Distinguish between CPM and PERT 7M  
b) A small size project consists of six activities. The project activity times in days are given below.

Activity/nodes	Optimistic Time	Most likely Time	Pessimistic Time
1-2	2	8	6
2-3	1	1	1
2-4	2	6	20
3-5	5	7	10
4-5	4	5	6
5-6	2	5	8

- i).Construct the project network.
- ii).Find the expected time and standard deviation of each activity.
- iii).Find the critical path and project completion time. 7M
7. a) Explain the concept of TQM 7M  
b) An electronic industry in the process of a developing new model of computer recorded the following number of defects in each. All the relevant data are given below. The defective pieces from 1<sup>st</sup> to 10<sup>th</sup> are 2, 4, 1, 5, 5, 6, 4, 0, 5 and 7 respectively. Compute the control limits and depicts the readings on a C-control chart. 7M
8. a) Distinguish between job evaluation and merit rating 7M  
b) Explain rowan and Budax wage incentive plans 7M

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III B.Tech. II Semester Supplementary Examinations Nov/Dec 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) Explain terms: unilateral and bilateral tolerance, shaft basis and hole basis system, interchangeability and selective assembly 7M
- b) Determine and sketch the limits of tolerance and allowance for a 25mm shaft and hole pair designated as H<sub>8</sub>-d<sub>9</sub>. The basic size lies in the range of 18-30mm. The multipliers for grade 8 and 9 are 25 and 40 respectively. The fundamental deviation for 'd' shaft is (-16D<sup>0.44</sup>) microns 7M
2. a) Explain the principle of comparison of an end gauge with a line standard method. 7M
- b) Four length bars of basic length 100 mm are to be calibrated using a calibrated length bar of 400mm whose actual length is 399.9992 mm. it was also found that lengths of bars B, C and D in comparison to A are +0.0002 mm, +0.0004 mm and -0.0001 mm respectively and the length of all the four bars put together in comparison to standard calibrated bar is +0.0003 mm longer. Determine the actual dimensions of all the four end bars. 7M
3. a) Describe the working principle of Tool Maker's microscope? 7M
- b) What are the applications and advantages of interferometer? 7M
4. a) Describe any of the optical comparator with neat sketch and derive an expression for its magnification. 7M
- b) Give two examples in which waviness on a surface would be desirable. Give two examples in which it would be undesirable. 7M
5. a) Draw an illustrative line diagram of a pitch measuring machine and describe it's working. 7M
- b) When measuring the effective diameter of an external screw thread gauge of 3.5 mm pitch. A 30.500 mm diameter cylindrical standard and 2.000mm wires were used. The micrometer readings over the standard wires and gauge cylinders were 13.3768 and 12.2428 mm respectively calculate the thread gauge effective diameter. 7M
6. Name the various alignment tests to be performed on lathe machines. Describe any four in detail. 7M
7. a) Describe briefly the following method of tooth thickness measurement  
(i) Chordal Thickness Method (ii) Base Tangent Method 7M
- b) Define the term Constant Chord. Calculate the chord length and its distance below the tooth tip for a gear of module 3 and 20 pressure angle 7M
8. a) Why is galvanizing important for automotive-body sheet metals? 7M
- b) Explain why some parts may be coated with ceramics. Give some examples. 7M

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Code : 1G564

III B.Tech. II Semester Supplementary Examinations Nov/Dec 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 how Reheating will improve the performance of Gas Turbine? 7M  
 b) Give the differences between open cycle Gas Turbine and Closed cycle Gas Turbine. 7M
2. A turbo jet engine flying at a speed of 960 km/hr consumes air at the rate of 54.5 kg/sec. Calculate  
 a) Exit velocity of jet if the enthalpy change for the nozzle is 200 kJ/kg and velocity coefficient is 0.97  
 b) Fuel flow rate in kg/sec  
 c) Thrust specific fuel consumption  
 d) Thermal efficiency of the plant when the combustion efficiency is 93 % and calorific value of the fuel is 45000 kJ/kg  
 e) Propulsive power  
 f) Propulsive efficiency  
 g) Overall efficiency 14M
3. a) What is meant by 'mechanical refrigeration', explain? 4M  
 b) A refrigerator working on Bell-Coleman cycle operates between pressure limits 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10°C. Air coming out of compressor is cooled at 30°C before entering the expansion cylinder. Expansion & compression follow the law  $PV^{1.25} = \text{Constant}$ . Determine the theoretical COP of the system. Take  $\gamma = 1.4$  &  $C_p = 1 \text{ kJ/kg K}$  for air. 10M
4. a) With the help of P-H diagram, explain the effect of Super heating and Sub cooling in Vapour Compression Refrigeration system. 6M  
 b) Explain the working of Vapour Compression Refrigeration system with a sketch. 8M
5. a) What is the basic function of a compressor in vapour compression refrigeration systems? How this function is achieved in vapour absorption refrigeration system? 4M  
 b) With the help of neat diagram, explain the working of a Lithium bromide-water absorption refrigeration system. 10M
6. a) Explain different Psychrometric processes involved in Air Conditioning systems. 7M  
 b) 10 grams of moisture per kg of dry air is removed from atmospheric air when it is passed through an air conditioning system and its temperature becomes 30°C. The atmospheric conditions are 40°C DBT and 60% RH. Find the following.  
 i. Relative humidity  
 ii. Wet bulb temperature  
 iii. Dew point temperature 7M
7. a) With the aid of simple sketch, explain the working of a centrifugal dust collector. 7M  
 b) What are the different methods of humidifying the air? Explain the working of any one of the atomizing the water type humidifier. 7M
8. a) What is meant by 'comfort air conditioning'? Discuss the factors that affect the human comfort with explanation. 7M  
 b) With the help of a neat sketch explain the working of Summer A/C system. 7M

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