Hall Ticket Number :										

R-11 / R-13

Code: 1G562

III B.Tech. II Semester Supplementary Examinations May 2017

CAD/CAM

(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) Explain the product cycle in the light of CAD/CAM. 8M
   b) Explain the benefits of CAD over conventional design process. 6M

2. a) What are the various display control commands available in a drafting system? 4M
   b) A line with end points (1,1), (10,10) is subjected to following transformations in succession. Rotate by 30^0, followed by uniform scaling of 3 units and finally mirror reflection about X-axis. Determine the co-ordinates of end points of the transformed line. 10M

3. A cubic Bezier curve is defined by the control points as (1, 3), (4, 5), (5, 7) and (8, 4). Find the equation of the curve and calculate the point at u=0.4 and u=0.6. 14M

4. a) Compare and contrast between several input systems used in NC system. 7M
   b) Explain the role of a Part Programmer in Manual Programming Method and Computer Assisted Part Programming Method. 7M

5. a) Explain the composite part concept in group technology with an example. 8M
   b) Explain the benefits of a well designed classification and coding system for group technology. 6M

6. a) Discuss the data files and system reports generated by the computer control systems of an FMS. 7M
   b) What are the three major elements of an ASRS? Explain. 7M

7. a) State and elaborate on the advantages of CIM in a manufacturing unit. 6M
   b) What are the three fundamental concepts in MRP? Explain them. 8M

8. a) Outline the objectives of computer-aided quality control. 6M
   b) Explain any one non contact inspection method with neat sketch. 8M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G565

III B.Tech. II Semester Supplementary Examinations May 2017

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) Write the advantages of ball and roller bearings over bush bearings. 4M

   b) A 75 mm long full journal bearing of diameter 75 mm supports a radial load of 12 KN at a shaft speed of 1800 rpm. The clearance ratio is 0.001. The viscosity of oil is 0.01 PaS (10 cP) at the operating temperature. Find the coefficient of friction, heat generated and power loss due to friction. 10M

2. With neat sketch explain the detailed design procedure of piston? 14M

3. Design a connecting rod of I section for a petrol engine for the following specifications:

Cylinder diameter	: 100 mm.
Max. Explosion pressure	: 1.2 MPa.
Length of connecting rod	: 300 mm.
Stroke length	: 120 mm.
Speed of engine	: 1500 rpm.
Weight of reciprocating parts	: 12 N.
Compression ratio	: 6:1.
Design stress for the material used	: 90 N/ mm^2,
Design bearing stress	: 12 N/ mm^2,
Design stress for bolts	: 60 N/ mm^2 .

   14M

4. A crane hook of trapezoidal cross section of depth 90 and the inner and outer sides of 100 mm and 60 mm has the centre of curvature at a distance of 90 mm from the inside of the section. Determine the maximum stresses induced at inner and outer fibres when he hook lifts a load of 60KN. 14M

5. Design a flat belt to transmit 15 kW at 1200 rpm from a 120 mm effective diameter pulley to a 360 mm diameter pulley. The centre distance is 1.5 m. ThicKNess of the belt is 12 mm and allowable stress is 2.1 MPa. The belt weighs 10 KN / m^3. 14M

6. Design a pair of steel spur gears (σ_0 = 180 MPa) to transmit 40 kW at 4000 rpm of 20 tooth pinion at a transmission ratio of 5. The teeth are 20^0 full depth involute form. Find the module, face width and pitch diameters. Recommend suitable hardness for both gears. 14M

7. A railway wagon weighing 18 KN and moving with a velocity of 9 kmph is brought to rest by a bumper consists of 4 helical compression springs set in parallel. In bringing the wagon to rest, the springs undergo a compression of each 300 mm. The spring index is 6 and allowable shear stress for the spring material is 300 MPa. Rigidity modulus is 80 GPa. Design a suitable spring. 14M

8. A square threaded screw 36 mm diameter and 6 mm pitch is required to move a load of 12 KN at a speed of 1.2 m / min. The end of the screw is carried on a thrust collar of 60 mm outside diameter and 30 mm inside diameter. The coefficient of thread friction is 0.12 and collar friction is 0.15. Find the power required to drive the load and the efficiency. Also find the length of bronze nut required taking the allowable bearing pressure as 9 MPa. 14M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G561

III B.Tech. II Semester Supplementary Examinations May 2017

Instrumentation and Control Systems

(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 are different types of transducers?	7M
	b)	Explain about LVDT with a neat sketch.	7M
2.	a)	Explain about the terms i) Pressure ii) Absolute pressure iii) Gauge Pressure iv) Vacuum Pressure	7M
	b)	Explain about thermal conductivity gauge.	7M
3.	a)	Explain the construction , working and application of Hot wire anemometer	7M
	b)	Explain about Thermistors.	7M
4.	a)	Explain about different types of torsion meters.	7M
	b)	Explain about seismic accelerometer	7M
5.	a)	Define Strain and explain about different strain measuring techniques.	7M
	b)	Explain about bonded strain gauges and different bonding techniques.	7M
6.	a)	Differentiate between open loop and closed loop control systems.	7M
	b)	Explain about pneumatic control system with a block diagram.	7M
7.	a)	What are the standard test inputs?	7M
	b)	Explain about steady state error and error constants?	7M
8.	a)	Explain the Concept of stability and necessary conditions for stability.	7M
	b)	Explain about Routh-Hurwitz stability criterion.	7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G566

III B.Tech. II Semester Supplementary Examinations May 2017

Industrial Management

(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		Explain Douglas MC-Gregors Theory X and Theory Y?	14M
2		Explain the concept, advantages, disadvantages & applications of line and staff organization?	14M
3	a)	Define plant location? And factors effecting the plant location?	7M
	b)	Explain different types of production in plant lay out?	7M
4	a)	Define work measurement. State its objectives?	7M
	b)	A Work sampling study was conducted for 100 hours in the machine shop in order to estimate the standard time. The total no of observations recorded were 2500. No working activity could be noticed for 400 observations. The ratio between manual and machine elements was 2:1. Average rating factor was estimated as 1.15 and the total no of articles produced during the study period were 6000.	7M
5	a)	Explain classifications of inventory techniques?	7M
	b)	Explain stores management. And state its applications?	7M
6		A small engineering project consists of 6 activities namely A, B, C, D, E and F with duration of 4, 6, 5, 4, 3, and 3 days respectively. Draw the net work diagram. And calculate EST, LST, EFT, LFT and floats. Mark the critical path and find total project duration?	14M
7	a)	Explain statistical quality control techniques?	7M
	b)	Explain single sampling plan and OC curves?	7M
8	a)	Explain different types of job evaluation methods?	7M
	b)	Explain product life cycle?	7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G563

III B.Tech. II Semester Supplementary Examinations May 2017

Metrology and Surface Engineering

(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) Describe briefly the system of obtaining different types of fits, with suitable examples. 7M
   b) Discuss importance of interchangeability and selective assembly. 7M
2. a) Differentiate between line standard and end standard. 7M
   b) Design and make a drawing of general purpose go and no-go plug gauge for inspecting a hole of 22D8.
   [Data with notations: i *(microns)=0.45* $D+0.001D$; Fundamental deviations for hole D = $16^{0.44}$; Value for IT8=25i] 7M
3. a) Explain the principle of interference and describe optical flat along with its different types. 7M
   b) Write short notes on
      i) Straight edges
      ii) Auto-colllimator 7M
4. a) In the measurement of surface roughness, heights of 20 successive peaks and valleys were measured from a datum measured over a length of 25 mm and their values are: 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35 and 20 micros. Calculate Centre Line Average (CLA) value and Root Mean Square (RMS) values of the surface. 7M
   b) With the help of a neat diagram describe the construction and working of the Tayler-Hobson's 'Talysurf'. 7M
5. a) Show that the best wire size for measuring effective diameter of threads is given by $d_b = (P/2)\ \mathrm{Sec}\ (\theta/2)$, where P is pitch of thread and θ is half of the included angle of thread. 7M
   b) Discuss the various types of pitch errors along with their causes and effects. 7M
6. a) Describe the importance of alignment test of a machine tool, give any three equipment's required for alignment test and list various geometrical checks generally carried out on machine tools. 7M
   b) Explain the procedure with neat sketches to check alignment radial drilling machine with respect to the following items:
      i) Squareness of spindle axis to the base plate
      ii) Levelling of base plate 7M
7. Enumerate the different methods of tooth thickness measurement and explain gear tooth Vernier with neat diagram. 14M
8. a) Explain why the surface treatment of manufactured products may be necessary and explain any one method/process studied under overlay coatings 7M
   b) Write short note on
      i) Laser Peening
      ii) Physical vapor deposition 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G564

III B.Tech. II Semester Supplementary Examinations May 2017

Thermal Engineering-III

(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) Explain the working of closed cycle gas turbine with a neat sketch. 4M

   b) Air enters the compressor of a gas turbine plant operating on air standard cycle at 100 kPa and 300 K with a volumetric flow rate of 5 m^3/s. The compressor pressure ratio is 10. The turbine inlet temperature is 1400 K. The turbine and the compressor each has an isentropic efficiency of 80 %. Calculate i) thermal efficiency of the cycle ii) the back work ratio iii) Net power developed in kW. 10M

2. a) The diameter of the propeller of an aircraft is 2.5 m. It flies at a speed of 540 km/h at an elevation of 8000 m, where air density is 0.525 kg/m^3. The flight to jet speed ratio is 0.75. Calculate **i**) air flow rate through the propeller **ii**) thrust produced **iii**) specific thrust **iv**) specific impulse v) thrust power. 10M

   b) Explain the process of expansion in turbine and nozzle in a turbojet cycle. 4M

3. A reversed Carnot cycle air conditioner of 1 Ton of refrigeration capacity operates with cooling coil temperature of t_o= 5 ^oC. The surrounding air temperature at 43 ^oC is used as a cooling medium rising to a temperature of 53 ^oC. The temperature of heat rejection is 55 ^oC. The overall heat transfer coefficient of heat exchanger between working substance and surrounding air is 250 W / m^2 K. Determine the mass flow rate of surrounding air entering the heat exchanger, area of heat exchanger, COP and power consumption of air conditioner. 14M

4. a) Draw the schematic diagram of vapor compression system of refrigeration with labeling. 4M

   b) A R12 vapor compression system operating at condenser temperature of 40 ^oC and evaporator temperature of -5 ^oC develops 15 tons of refrigeration. Calculate **i**) mass flow rate of refrigerant circulated, **ii**) theoretical piston displacement of compressor and piston displacement per ton of refrigeration, **iii**) Horsepower per ton of refrigeration, **iv**) heat rejected in the condenser, **v**) Carnot COP and actual COP of the cycle. (Use P-h charts for R12) 10M

5. In an ammonia absorption system with an analyzer but without a dephlegmator, the following data are given: Condenser pressure 20.3 bar, evaporator pressure 2.1 bar, Generator temperature 156 ^oC and absorber temperature 40 ^oC. With reference to h-ξ charts and schematic diagram the data is given in Table 1.

Determine the terms, per unit mass of vapor distilled i) specific solution circulation rate, ii) heat transfer in liquid-liquid heat exchanger iii) heat added in the generator iv) pump work v) COP vi) Energy Balance

State point	Pressure (p) bar	Temperature (t) ^oC	Concentration (ξ) NH_3(kg)/Mixture(kg)	Enthalpy (h) kJ/kg
1	20.3	---	0.34	---
2	20.3	156	0.2	616
3	20.3	67	0.2	205
3a	2.1	67	0.2	205
4	2.1	40	0.34	63
4a	20.3	40	0.34	63
1a	20.3	---	0.34	---
5-7	20.3	---	0.913	1947
8	20.3	53	0.913	507
9	20.3	40	0.913	444
10	2.1	-16	0.913	444
11	2.1	5	0.913	1281
12	2.1	---	0.913	---

14M

6. a) Describe basic psychrometric processes in air conditioning with necessary sketches? 7M

b) Moist air enters a chamber at 5 ^oC DBT and 2.5 ^oC WBT at a rate of 90 m^3/min. The barometric pressure is 1.01325bar.While passing through the chamber; the air absorbs sensible heat at the rate of 40.7 kW and picks up 40 kg/h of saturated steam at 110 ^oC. Determine the dry and wet bulb temperatures of the leaving air. 7M

7. Air at 32.2 ^oC DBT and 50% RH, enters a spray type humidifier at the rate of 4.717 m^3/s. Chilled water enters at 4.4 ^oC and leaves at 11.2 ^oC. The ratio of water to air mass flow rate is 1.2. The face velocity of air is 2.032 m/s. The value of the product k_ω *a* may be taken as kg/sm^3. Calculate the length of dehumidifier and the state of air at the exit assuming parallel flow. 14M

8. a) Explain various purposes of ventilation? 7M

b) Describe about summer air conditioning with neat sketch? 7M

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