Hall Ticket Number :										

R-11/R-13

Code : 1GA51

III B.Tech. I Semester Supplementary Examinations May/June 2016

Managerial Economics and Financial Analysis

(Common to CE, ME and ECE)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. What is managerial economics? Explain the relationship of Managerial Economics with other disciplines. 14M
2. What do you understand by 'Elasticity of Demand'? write about Demand Forecasting methods 14M
3. What is BEP? Draw break even chart and explain its objectives, importance and its assumptions. 14M
4. What is market? Explain its importance when competition is perfect 14M
5. a) What are the different forms of business organizations? 6M
   b) Explain the present role and importance of private sector organization to develop India 8M
6. Explain different DCF methods in capital budgeting? Step by step of evaluation of NPV method with an example 6M 8M
7. From the following data of San Pre Ltd. Co. as on 31-03-2014 you are required to prepare final accounts.

Particulars	Debit (in ₹)	Credit (in ₹)
Stock (01-04-2014)	25000	
Purchases	200000	
Carriage inward	5000	
Carriage outward	10000	
Discount	8000	
Wages	10000	
Salaries	17000	
Rent	15000	
Sales		335000
Rates and Taxes	10000	
Sundry Debtors and Creditors	50000	20000
Term loan		55000
Bills Receivables and Payables	35000	15000
Investment	20000	
Cash at Bank	20000	
Furniture	30000	
Land and buildings	50000	
Vehicles	20000	
Capital		100000
	525000	**525000**

Closing Stock (31-03-2013) ₹ 65000/- 14M

8. What is meant by ratio analysis? Discuss its objectives and limitations 14M

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Hall Ticket Number :										

R-11/R-13

Code : 1G551

III B.Tech. I Semester Supplementary Examinations May/June 2016

Thermal Engineering-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) Derive an expression for the efficiency of a Rankine cycle 8M
   b) Explain combined cycle with the help of a neat sketch 6M
2. a) Classify steam boilers. 7M
   b) What are boiler mountings? Mention their purposes. 7M
3. a) The following readings were obtained during a boiler trial of 6 hours duration. Mean steam pressure= 12 bar, mass of steam generated= 40000 kg, mean dryness fraction= 0.85, mean feed water temperature= 30^0C, coal used= 4000 kg, calorific value of coal= 33400 kJ/kg. Calculate **i**) factor of equivalent evaporation **ii**) equivalent evaporation from and at 100^0C and **iii**) efficiency of the boiler. 8M
   b) List the merits of mechanical draught over natural draught 6M
4. a) Explain the phenomenon of Supersaturated flow in a steam nozzle. 6M
   b) Steam at a pressure of 10 bar and 0.98 dry is passed through a convergent-divergent nozzle to a back pressure of 0.1 bar. The mass flow rate is 0.55 kg/sec. Find **i**) Pressure at the throat and **ii**) number of nozzles used if each nozzle has throat area of 0.5 cm^2. The enthalpy drop used for reheating the steam by friction in the divergent part is 10% of the overall isentropic drop. Take index of expansion as 1.13. 8M
5. a) Derive an expression for the maximum efficiency of a single stage impulse turbine 8M
   b) Describe velocity compounding of an impulse steam turbine. 6M
6. a) In a reaction turbine the fixed blades and moving blades are of the same shape but reversed in direction. The angles of the receiving tips are 35^0 and of the discharging tips 20^0. Find the power developed in kW per pair of blades for a steam consumption of 2.5 kg/s. The blade speed is 50 m/s. Determine the efficiency of the pair, if the enthalpy drop in the pair is 10 kJ/kg. 8M
   b) Explain governing of Reaction Steam Turbine 6M
7. a) Describe the working principle of a Low Level Condenser with a neat sketch. 10M
   b) Classify Cooling Towers 4M
8. a) List out the stationary and moving parts of a Steam Engine. 6M
   b) A single cylinder double acting steam engine receives steam at 10 bar and exhaust at 50 kpa. The dryness of the inlet steam is 96%. The power developed by the engine when running at 210 rpm is 45 kW, with steam consumption of 460 kg/hr. The engine bore is 25 cm and the stroke is 37.5 cm. The expansion stroke is 6. Calculate the diagram factor and the indicated thermal efficiency of the engine. 8M

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Hall Ticket Number :										

Code : 1G552

R-11/R-13

III B.Tech. I Semester Supplementary Examinations May/June 2016

Dynamics of Machinery

(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. Each wheel of a four-wheeled, rear-engine automobile has a moment of Inertia of 2.4kg-m^2 and an effective diameter of 600mm. The rotating parts of the engine have a moment of Inertia of 1.2kg-m^2. The gear ratio of engine to back wheel is 3 to 1. The engine axis is parallel to the rear axle and the crank shaft rotates in the same sense as the road wheels. The mass of the vehicle is 2200kg and the center of the mass is 550mm above the road level. The track width of the vehicle is 1.5m. if the velocity of the vehicle is 25 kmph and it takes a turn with 30m radius, determine the vertical reaction on each wheel taking in to the consideration of gyroscopic and centrifugal effects. 14M

2. a) Describe with a neat sketch the working of a single plate friction clutch. 8M

   b) An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12º, force acting parallel to the plane. If the angle of inclination is increased to 15º, then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. 6M

3. a) Describe with a neat sketch a centrifugal clutch and deduce an equation for the total torque transmitted. 8M

   b) A single plate clutch, with both sides effective, has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm2. If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m. 6M

4. The torque exerted on the crank shaft of a two stroke engine is given by the equation T(N-m) = 14000+2300 Sin2Ø -1900Cos2Ø , where Ø is the crank angle displacement from the Inner dead center. Assuming the resisting torque to be constant, determine **(i)** The power of the engine when the speed is 150rpm, **(ii)** The moment of inertia of the flywheel if the speed of the variation is not to exceed ± 0.5% of the mean speed and **(iii)** the angular acceleration of the flywheel when the crank has turned through 30^0 from Inner dead center. 14M

5. In a spring loaded governor of the Hartnell type, the mass of each ball is 6kg and the lift of the sleeve is 60mm. The speed at which the governor begins to float is 260rpm and at this speed the radius of the ball path is 120mm. The mean working speed of the governor is 22 times the range of speed when friction is neglected. If the lengths of ball and roller arm of the bell crank lever are 150mm&120mm respectively and if the distance between the center of pivot of bell crank lever & axis of governor spindle is 160mm, determine the initial compression of spring taking in to account the obliquity of arms. If friction is equivalent to a force of 40N at the sleeve, find the total alteration in speed before the sleeve begins to move from mid-position. 14M

6. a) A shaft carries five masses A, B, C, D and E which revolve at the same radius in planes which are equidistant from one another. The magnitude of the masses in planes A, C and D are 50 kg, 40 kg and 80 kg respectively. The angle between A and C is 90° and that between C and D is 135°. Determine the magnitude of the masses in planes B and E and their positions to put the shaft in complete rotating balance. 10M

   b) Explain the method of balancing of different masses revolving in the same plane. 4M

7. The cylinder center lines of a five cylinder in-line engine are pitched at equal intervals of 20cm, and the cranks are also spaced at equal angular intervals. The crank and connecting rod are 75mm and 250mm long respectively. The reciprocating parts mass is 5.946kg per cylinder. Investigate the state of balance of the engine due to primary and secondary effects and calculate their values when the engine is running at 1200 RPM. Take the central plane i.e. of cylinder number3 as the reference plane. 14M

8. a) Shaft of diameter 40mm and 2.5m long has a mass of 15kg/m. It is simply supported at ends and carries three masses 90kg, 140kg, 60kg at 0.8m, 1.5m, 2m respectively from the left support. Find the frequency of transverse vibration by using dunkerley's method. Take E= 200G N/m^2 8M

   b) Discuss the variation of the Magnification factor with frequency ratio for various amount of damping in a system 6M

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Hall Ticket Number :										

R-11/R-13

Code : 1G553

III B.Tech. I Semester Supplementary Examinations May/June 2016

Machine Tools

(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 different types of chip breakers used in metal cutting operations 7M
   b) Explain the devices used in measurement of cutting forces. 7M

2. a) Distinguish between a turret and a capstan lathe. 7M
   b) What are different lathe operations? Explain. 7M

3. a) Explain various work holding devices used in reciprocating machines. 7M
   b) Explain feed mechanism used in shaping machines. 7M

4. a) What is a twist drill? Explain its nomenclature. 7M
   b) What are operations performed in horizontal boring machine. 7M

5. a) Explain nomenclature of plain milling cutter used in milling operations. 7M
   b) Explain down milling and up milling. Differentiate them. 7M

6. a) Write about tool and cutter grinding machine. 7M
   b) Explain the working principle of surface grinder. 7M

7. a) What different types of coolants and their advantages used in broaching machine 7M
   b) What are merits and demerits of broaching machine over other methods? 7M

8. a) What are advantages of Jigs and fixtures? Explain 7M
   b) Explain fundamental principles of jigs and fixtures design. 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G554

III B.Tech. I Semester Supplementary Examinations May/June 2016

Design of Machine Elements-I

(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 general considerations of design? 7M

   b) Write brief note of BIS codes of materials? 7M

2. a) A vertical round rod 1.2 m long is struck by a weight of 600 N that falls on the top of it from a height of 30 mm. The Modulus of elasticity of the material is 2 x 10^5 MPa. Find suitable diameter of the rod if the maximum stress induced due to impact is to be limited to 150 MPa . 7M

   b) Find the diameter of a round rod subjected to a combined bending moment of 3 kNm and a torque of 1.5 kNm from the following theories of failure?

      i) Rankine's Theory and

      ii) Guest Theory

      The allowable normal and shear stresses for the material are 120 MPa and 75 MPa respectively. 7M

3. a) Define stress concentration factor. Give 4 examples of stress concentration with neat sketches. 7M

   b) A cantilever beam 200 mm depth, 2 m long is subjected to a transverse at its free end that fluctuates from 60 kN downward to 30 kN upward. The material has a yield stress of 420 MPa and normal endurance stress of 360 MPa. Find suitable width of the beam taking factor of safety as 1.5 7M

4 a) With neat sketch explain any 3 type's screw threads and their uses. 5M

   b) Determine the diameter of rivet for a bracket loaded as shown in the figure 4b. The allowable stress for the rivets may be taken as 72 MPa.

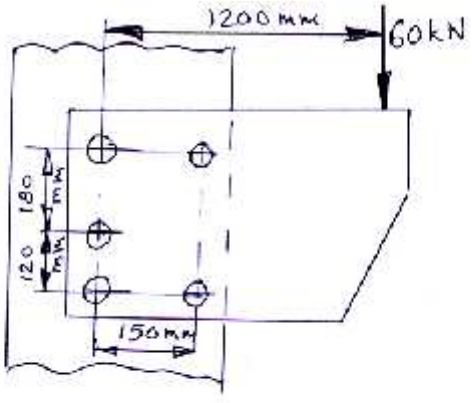


Fig: Q 4b

9M

5. a) Determine the strength of a joint welded as shown in figure 5a. The allowable tensile and shear stress in the weld are 100 MPa and 66 MPa respectively. The size of the weld may be taken as 8 mm.

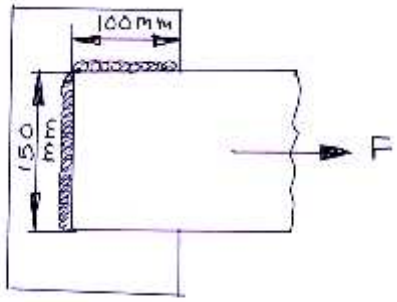
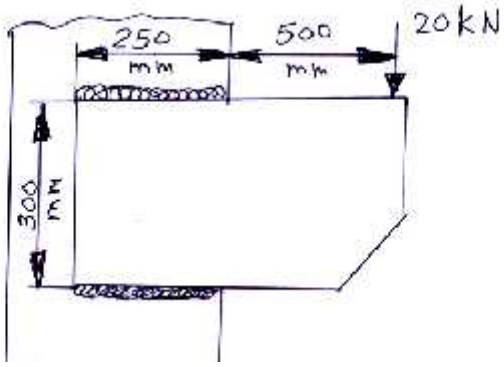


Fig: Q 5a

7M

b) Determine the size of weld for a bracket welded as shown in figure 5b. The allowable shear stress in the weld is 75 MPa.



7M

6. a) Design knuckle joint to two rounds rods and to support an tensile load of 60 kN. The allowable tensile stress = 90 MPa, Allowable shear stress = 55 MPa and allowable crushing stress = 125 MPa. 7M

b) Design a cotter joint to two rounds rods and to support an axial load of 100 kN. The allowable tensile stress = 80 MPa, Allowable shear stress = 50 MPa and allowable crushing stress = 120 MPa. 7M

7. a) Write the advantages of hollow shafts over solid shafts. 2M

b) A solid steel shaft transmits 15 kW at 1200 rpm. Find suitable diameter of the shaft taking allowable shear as 72 MPa. What will be the diameters of a hollow shaft made of the same material if their ratio is 0.5? What percentage of material is saved by replacing the solid shaft with hollow one of same material and length? 12M

8. a) Design a solid muff coupling to transmit 8.4 kW at 300 rpm. The allowable stresses for CI muff in shear is 5 MPa, for steel shaft and key are 60 MPa in shear and 110 MPa in crushing. 5M

b) Design a CI flange coupling to transmit 10 kW at 1500 rpm. The allowable shear stress for the CI flange is 4.5 MPa and the allowable stresses for the shaft, keys and bolts material are: 72 MPa in shear, 120 MPa in crushing. 9M

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Hall Ticket Number :										

R-11/R-13

Code : 1G555

III B.Tech. I Semester Supplementary Examinations May/June 2016

Heat Transfer

(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) The insulation boards for air conditioning purposes are made of three layers, middle one being packed grass of 10 cm thick (k = 0.02 W/m-K) and the sides are made of plywood's of 2 cm thick each (k = 0.12 W/m-K). They are glued with each other. (a) Determine the heat flow per m^2 area if one surface is at 35^0C and other surface is at 20^0C. Neglect the resistance of glue. (b) Instead of glue, if these three pieces are bolted by four steel bolts of 1 cm diameter at the corners, (k = 40) per m^2 area of the board then find the heat flow per m^2 area of the board 10M

   b) A current of 200 amps is passed through a Ni–chromium wire (k = 17 W/m K) of 3 mm diameter. The resistivity of Ni – cr is 100 cm and the length of the wire is 1m. The wire is submerged in a liquid at 120^0C and experiences a convective heat transfer coefficient of 4000 W/m^2K. Calculate the surface temp& central Temp of the wire. 4M

2. a) A steel plate of 1m^2 area is provided with 200 fins of diameter 1 cm and length 15 cm made of Cu (k=300 W/mK). The base temperature is at 200^oC and environment is at 40^oC, with h= 20 W/m^2K. Determine a) fin efficiency b) heat lost from the plate, c) effectiveness of the arrangement. 10M

   b) Derive the expression for corrected length for rectangular and circular fins. 4M

3. a) A slab of 15 cm thick is originally at a temperature of 500^oC. It is suddenly immersed in a liquid at 100^oC resulting in a heat transfer coefficient of 1000 W/m^2K. Determine the temperature at the centreline and on the surface 30 minutes after immersion. Also calculate the total thermal energy removed per unit area during this period. Take $\alpha = 6.1 \times 10^{-6}$ m^2/s, k = 40 W/m K. ρ = 7800 kg/m^3 and C = 840 J/kg K. 10M

   b) Derive temperature distribution equation for a lumped system in terms of Fourier and Biot numbers. 4M

4. a) Air at a temperature of 40^oC flows over a flat plate of 2m long maintained at 120^oC with a velocity of 5 m/s. Determine the average heat transfer coefficient and rate of heat transfer between the plate and air per metre width. 9M

   b) Differentiate between Reynolds's analogy and Colburn analogy. 5M

5. a) The glass door of a furnace is having dimensions of height 0.75 m and width 1.5 m at a temperature of 230^{o}C. If the outside air temperature is 25^{o}C estimate the heat loss from the door to atmosphere. 10M

   b) Signify the application of a non-dimensional quantity to identify the mode of convection i.e natural or combined. Quote examples 4M

6. a) In a parallel flow double pipe heat exchanger hot water enters at the rate of 10 kg/min and at a temperature of 70^{o}C and leaves at 50^{o}C. The cold water enters at 25^{o}C with a flow rate of 25 kg/min. Calculate the area of heat exchanger required (i) if heat transfer coefficients inside and outside the pipes are 60 W/m^{2}K, (ii) If the hot water flow rate is doubled without changing inlet temperature what will be the exit temperature of both fluids? 10M

   b) Signify NTU and LMTD 4M

7. a) A 2.5 cm diameter pipe whose surface is maintained at 1000 K having emissivity 0.1 is enclosed inside a large pipe of diameter7.5cm maintained at 350 K. Determine the heat loss from the inner pipe to outer pipe per metre length if the emissivity of the outer pipe is 0.3. 10M

   b) Derive Stefan Boltzmann's law from Plank's law. 4M

8. a) Differentiate thermal conductivity and thermal diffusivity. List any five engineering materials with examples 7M

   b) Illustrate the development of hydrodynamic and thermal boundary layers on a vertical plate in natural convection. 7M

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