Hall Ticket Number :										

Code : 1GA51 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

Managerial Economics and Financial Analysis

(Common to CE, ME & ECE)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. Managerial economics is the application of economic theory to business management. Discuss. 14M
2. What is elasticity of demand? Explain price elasticity of demand and its measurements. 14M
3. What is production function? Explain the concept of Cobb-Douglas production function. 14M
4. Critically examine the role of price fixation with reference to different pricing methods 14M
5. Compare and contrast public and private sector organisations? Suggest are the private sector business organizations promoted Indian economy globally 14M
6. From the following data, you are required to calculate:

   Fixed Expenses ₹ 90000. Variable Cost per unit ₹ 5. Selling Price per unit ₹ 10

   a) BE Sales in Units and Rupees 4M

   b) P/V Ratio 4M

   c) Sales required earning a profit of ₹ 50,000. 6M
7. From the following Trial Balance of XYZ Ltd. Co as on 31st Dec, 2014 is given below. Prepare final accounting statements.

Particulars	Debit	Credit
Capital		1,50,000
Plant & Machinery	50,000	
Sundry Debtors and Creditors	40,000	20,000
Wages	25,000	
Purchases and Sales	2,15,000	3,80,000
Opening Stock	35,000	
Salaries	20,000	
Insurance	5,000	
Cash at Bank	30,000	
Cash on Hand	35,000	
Interest on Loan	10,000	
Discount	5,000	
Vehicles	35,000	
Term Loan		35,000
Bills Receivables and Payable	45,000	15,000
Furniture	50,000	
	6,00,000	**6,00,000**

Closing Stock was valued at ₹ 50000/-. 14M

8. Discuss the role and importance of ratio analysis to assess the performance of a firm 14M

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Hall Ticket Number :										

Code : 1G554 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

Design of Machine Elements

(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 the various engineering properties of a material? 7M

   b) What are the points to be considered in selecting an engineering material? 7M

2. a) Draw the stress- strain curve for a mild steel specimen indicating salient points. 7M

   b) Find the diameter of a round rod subjected to a combined bending moment of 2 kNm and a torque of 1.2 kNm? The allowable normal and shear stresses for the material are 120 MPa and 75 MPa respectively 7M

3. a) A flat plate of rectangular cross section 120 mm wide is subjected to a tensile load of 60 MPa. For some reason a hole of 12 mm is to be drilled exactly at the center of the plate. Find the required thickness of the plate if the stress due to stress concentration is to be limited to 90 MPa. 7M

   b) A connecting rod of circular cross section is subjected to an axial load that fluctuates between 120 kN tensile to 60 kN compressive. The material has a yield stress of 400 MPa and normal endurance stress of 350 MPa. Find suitable diameter of the rod taking factor of safety as 2.1 7M

4 a) Design a double riveted double strap butt joint for the longitudinal seam of a boiler of diameter 1.2 m and a steam pressure of 2 MPa. The following stress may be used. Allowable tensile stress in plates= 90 MPa, Allowable shear stress in rivets = 60MPa. Allowable crushing stress = 135 MPa. Joint efficiency = 75 %. 7M

   b) Determine the diameter of bolt for a bracket loaded as shown in the figure 4b. The allowable stress for the bolts may be taken as 60 MPa.

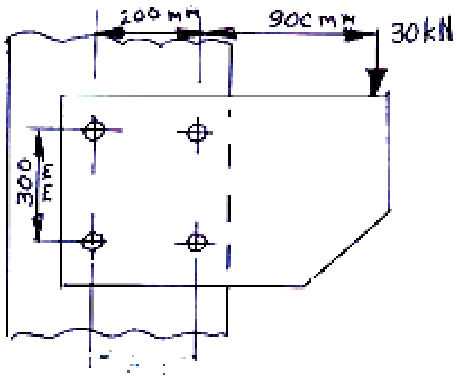

Fig Q4b

7M

5. a) Determine the length of parallel fillet weld for a joint loaded as shown in figure 5a. The allowable tensile and shear stresses in the weld are 110 MPa and 70 MPa respectively. The size of the weld may be taken as 5 mm.

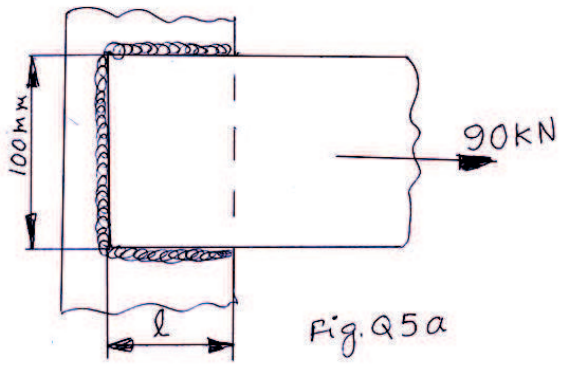

Fig. Q5a

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.

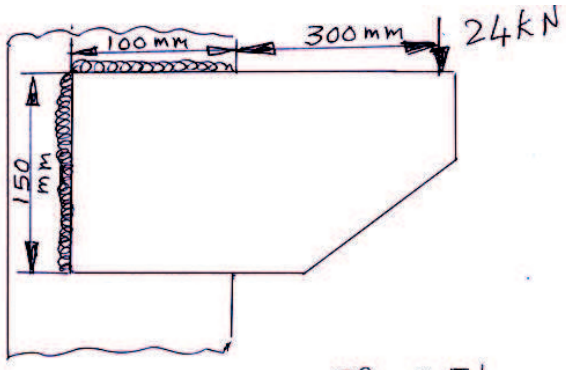

Fig Q.5b

7M

6. a) Design a cotter joint to two rounds rods and to support an axial load of 120 kN. The allowable tensile stress = 90 MPa, Allowable shear stress = 60 MPa and allowable crushing stress = 145 MPa. 7M

b) Design knuckle joint to two rounds rods and to support an axial load of 90 kN. The allowable tensile stress = 100 MPa, Allowable shear stress = 75 MPa and allowable crushing stress = 150 MPa. 7M

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

b) A solid steel shaft 1200 mm long is simply supported at its ends. It carries a central load of 1200 N. The shaft transmits 12 kW at 200 rpm. Find suitable diameter of the shaft taking allowable stresses in tension and shear as 100 MPa and 54 MPa. 12M

8. a) Select a rectangular key to transmit 10 kW at 1000 rpm. The allowable crushing and shear stresses for the shaft and key material are 120 MPa and 75 MPa respectively. 5M

b) Design a CI flange coupling to transmit 15 kW at 500 rpm. The allowable shear stress for the CI flange is 5 MPa and the allowable stresses for the shaft, keys and bolts material are: 60 MPa in shear, 115 MPa in crushing. 9M

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Hall Ticket Number :										

Code : 1G552 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

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. a) Define gyroscopic couple. 2M

   b) The mass of the turbine rotor of a ship is 8tonnes and the radius of gyration 0.6m. It rotates at 1800rpm clockwise when viewed from stern. Determine the gyroscopic effects in the following cases **i**) If the ship travelling at 100kmph steers to the starboard side in a curve of 75m radius. **ii**) If the ship is pitching and the bow is descending with maximum velocity, the periodic time is being 20seconds and the total angular movement between the extreme positions is 10^{0}. **iii**) If the ship is rolling at a certain instant has an angular velocity of 0.03rad/sec clockwise when looking from stern, In each case, explain clearly how you determine the direction in which the ship tends to move as a result of the gyroscopic action. 12M

2. a) What is meant by the expression 'friction circle'? Deduce an expression for the radius of friction circle in terms of the radius of the journal and the angle of friction. 6M

   b) An electric motor driven power screw moves a nut in a horizontal plane against a force of 75 kN at a speed of 300 mm/min. The screw has a single square thread of 6 mm pitch on a major diameter of 40 mm. The coefficient of friction at the screw threads is 0.1. Estimate power of the motor. 8M

3. a) Derive from first principles an expression for the friction moment of a conical pivot assuming Uniform pressure. 6M

   b) Determine the maximum, minimum and average pressure in plate clutch when the axial force is 4 kN. The inside radius of the contact surface is 50 mm and the outside radius is 100 mm. Assume uniform wear. 8M

4 A machine punching 38 mm holes in 32 mm thick plate requires 7 N-m of energy per sq. mm of sheared area, and punches one hole in every 10 seconds. Calculate the power of the motor required. The mean speed of the flywheel is 25 metres per second. The punch has a stroke of 100 mm. Find the mass of the flywheel required, if the total fluctuation of speed is not to exceed 3% of the mean speed. Assume that the motor supplies energy to the machine at uniform rate. 14M

5. a) For the same values of mass of the sleeve and height at given instant, proell governor requires smaller mass than that in porter governor to obtain the same equilibrium speed. Debate. 4M

   b) In a porter governor, the upper and lower arms are each 250mm long and are pivoted on the axis of rotation. The mass of each rotating ball is 35kg and the mass of the sleeve is 20 kg. The sleeve is in its lowest position when the arms are inclined at 30^0 to the governor axis. The lift of the sleeve is 36mm. Find the force of friction at the sleeve, if the speed at the moment it rises from the lowest position is equal to the speed at the moment it falls from the highest position. Also find the range of speed of the governor. 10M

6. a) Explain clearly the terms 'static balancing' and 'dynamic balancing'. State the necessary conditions to achieve them. 6M

   b) Four masses A, B, C and D revolve at equal radii and are equally spaced along a shaft. The mass B is 7 kg and the radii of C and D make angles of 90° and 240° respectively with the radius of B. Find the magnitude of the masses A, C and D and the angular position of A so that the system may be completely balanced. 8M

7. The firing order of a six cylinder vertical four stroke in-line engine is 1-4-2-6-3-5. The piston stroke is 80mm and the length of each connecting rod is 180mm. The pitch distances between the cylinder center lines are 80mm, 80mm, 120mm, 80mm and 80mm respectively. The reciprocating mass per cylinder is 1.2kg and the engine speed is 2400RPM. Determine the out of balance primary and secondary forces and couples of the engine taking a plane midway between the cylinder 3and 4 as the reference plane. 14M

8. A gun barrel weighing 5340N has a recoil spring of stiffness 292 KN/m. If the barrel recoils 1.22m on firing, determine The initial recoil velocity of the barrel, The critical damping co-efficient of a dash-pot which is engaged at the end of the recoil stroke and The time required for the barrel to return to a position 5cm from its initial position. 14M

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Hall Ticket Number :										

Code : 1G555 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

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) A cast iron pipe (k = 80 W/m K) having inside diameter 5cm and outside diameter 5.5cm carries steam at 320^0c with a convective heat transfer coefficient of 60 W/m^2K to reduce the heat loss the pipe is covered with 3cm thick glass wool (k = 0.05 W/m K). If the surroundings are 20^0 C and the combined convection and radiation heat transfer coefficient outside is 18 W/m^2 K. calculate the rate heat loss per meter length, intermediate temperatures and overall heat transfer coefficient based on outside surface area. 10M

   b) Derive the equation for temperature distribution in a hollow cylinder with internal heat generation 4M

2. a) An experimental device that produces excess heat is passively cooled. The addition of pin fins to the casing of this device is being considered to augment the rate of cooling. Consider a copper pin fin 0.25 cm in diameter that protrudes from a wall at 95°C into ambient air at 25°C. The heat transfer is mainly by natural convection with a coefficient equal to 10 W/m2 K. Calculate the heat loss, assuming that (a) the fin is "infinitely long" and (b) the fin is 2.5 cm long and the coefficient at the end is the same as around the circumference. Finally, (c) how long would the fin have to be for the infinitely long solution to be correct within 5%? 14M

3. a) A long cylindrical iron bar [ρ = 7800 kg/m^3, C = 460 J/kg. ^{o}C, and k = 60 W/(m ^{o}C)] of diameter D = 5cm, initially at temperature T_0 = 700^{o}C, is exposed to a cool air stream at T_α = 100 ^{o}C. The heat transfer coefficient between the air stream and the surface of the iron bar is h = 80 W/m^2.^{o}C. Determine the time taken for the centre temperature to reach 200 ^{0}C. Also find the temperature at a radius of 1 cm at that instant of time 10M

   b) What do you understand by the term time constant? State its significance in the design of Thermocouple junctions. 4M

4. a) Air enters at a temperature of 60^{o}C and flows through a 2.5 cm diameter tube with a velocity of 0.8 m/s. It can be heated either by **(i)** condensing steam on its outer surface or **(ii)** by electrical resistance heating. Calculate the value of heat transfer coefficient in both cases. Assume fully developed flow. 10M

   b) Illustrate the development of hydrodynamic boundary layer inside a pipe. 4M

5. a) A thin horizontal circular plate of 20 cm dia maintained at $100^{o}C$ is kept horizontally in a large pool of water at $20^{o}C$ in convecting heat from both of its faces. Determine the amount of heat input required to maintain the surface temperature of the plate at$100^{o}C$. Assume β for water = $0.75 \times 10^{-3}K$. 10M

   b) Identify which configuration, vertical or horizontal position of flat plate will result more heat transfer. Justify. 4M

6. a) In a double pipe parallel flow heat exchanger water is heated from $15^{o}C$ to $50^{o}C$ and hot oil is cooled from $130^{o}C$ to $60^{o}C$ (**i**) Determine the exit temperatures if the flow is made counter flow, without changing flow rates (**ii**) If the length of the tubes is increased keeping parallel flow configuration determine the minimum temperature to which the oil can be cooled and its effectiveness 10M

   b) Derive the expression for LMTD in counter flow double pipe heat exchanger. 4M

7. a) A thin aluminium sheet with an emissivity of 0.1 on both sides is placed between two very large parallel plates that are maintained at uniform temperatures T_1 = 800 K and T_2 = 500 K and have emissivities ε_1 = 0.2 and ε_2 = 0.2, respectively. Determine the net rate of radiation heat transfer between the two plates per unit surface area of the plates and compare the result to that without the shield. 10M

   b) Derive the expression for surface resistance and shape resistance using electrical analogy 4M

8. a) i) Derive efficiency of fin for a long and insulated tip conditions 5M

      ii) Derive temperature distribution for a long fin 5M

   b) Analyse the effect of Prandtl number on thermal and hydrodynamic boundary layers. 4M

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Hall Ticket Number :										

Code : 1G553 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

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 Merchants force diagram for a metal cutting operation. 7M
   b) Discuss about taper turning methods. 7M

2. a) Explain various tool holding devices adopted in lathe with neat sketches 7M
   b) Explain different types of lathe operations 7M

3. a) Write about principal parts of slotting machine with a schematic diagram. 7M
   b) Explain quick return mechanism used in shaping machine. 7M

4. a) What are different operations done on drilling machine? 7M
   b) Explain principal parts of jig boring machine with neat sketches. 7M

5. a) Classify the milling machines. Explain any one. 7M
   b) What is Indexing? Explain different methods used in indexing. 7M

6. a) How do you select the grinding wheel? 7M
   b) Explain the specifications of grinding wheel. 7M

7. a) Compare grinding, lapping and honing operations. 7M
   b) What are different types of broaches? Explain. 7M

8. a) Distinguish between jigs and fixtures. 7M
   b) Explain various locating devices and their applications. 7M

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Hall Ticket Number :										

Code : 1G551 **R-11 / R-13**

III B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2015

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) In a Rankine Cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar and the exhaust pressure is 0.25 bar. Determine **i**) Pump work **ii**) Turbine work **iii**) Rankine efficiency **iv**) condenser heat flow and **v**) dryness fraction at the end of expansion. Assume steam flow rate of 10 kg/s. 10M

   b) What do you mean by 'Reheating' and 'Regeneration' used for increasing the efficiency of a Rankine cycle 4M

2. a) Explain the working principle of a La Mont Boiler with a neat sketch. Mention its advantages 10M

   b) What do you mean by boiler mountings and accessories? Give examples 4M

3. a) Explain Equivalent Evaporation, boiler horse power and boiler efficiency 7M

   b) Find the mass of flue gases flowing through the chimney when the draught produced is equal to 2 cm of water. Temperature of the flue gases is 297^0C and ambient temperature is 27^0C. The flue gases formed per kg of fuel burned are 20 kg. Diameter of the chimney is 2 m. Neglect the losses. 7M

4. a) Derive an expression for the velocity and flow through the nozzle. 8M

   b) Steam expands from 3 bar to 1 bar in a nozzle. The initial velocity is 90 m/s and the initial temperature is 150^0C. The nozzle efficiency is 0.95. Determine the exit velocity. 6M

5. a) One stage of an impulse turbine consists of a row of nozzles one row of moving blades. The saturated steam enters the nozzles at a pressure of 15 bar with a velocity of 130 m/s. the pressure drops along the nozzles to 9 bar. The nozzles have discharge angle of 20^0 and the steam passes into the blades without shock. If the velocity co-efficient for nozzles is 0.9, determine for maximum efficiency conditions **i**) blade angles for equiangular blades **ii**) blade efficiency and **iii**) stage efficiency. 8M

   b) Describe Pressure Compounding method of a Steam Turbine 6M

6. a) Show that the degree of reaction of a Parson Reaction Turbine is 50% 8M

   b) Compare Impulse and Reaction Turbines 6M

7. a) Define vacuum efficiency and condenser efficiency. 4M

   b) What is the function of a cooling tower in a steam power plant? Describe the working principle of any one type of cooling tower with a neat sketch 10M

8. a) What do you mean by actual indicator diagram of a steam engine? Explain how it is different from theoretical indicator diagram? 7M

   b) Explain throttle governing used for a steam engine 7M

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