USN | | | | | | | | | | |

10AL51

Fifth Semester B.E. Degree Examination, June/July 2016
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define management, explain the levels of management. **(10 Marks)**
b. Define planning. Explain the types of plans with example. **(10 Marks)**

2 a. Explain in details any five functions of management. **(10 Marks)**
b. List and explain the characteristics of planning. **(10 Marks)**

3 a. Discuss the steps commonly followed by organizations in selection procedure. **(10 Marks)**
b. Discuss the different sources of recruitment. **(10 Marks)**

4 a. What are the purposes of communications in an organization? **(10 Marks)**
b. Discuss all the steps involved in a control process. **(10 Marks)**

PART – B

5 a. Define entrepreneur. Discuss four key elements in context to entrepreneurship. **(06 Marks)**
b. Explain entrepreneurs based on the type of business. **(08 Marks)**
c. Discuss three barriers in connection with entrepreneurship. **(06 Marks)**

6 a. Discuss steps in the location of small scale industry. **(10 Marks)**
b. Explain the important factors in the selection of a small scale industry site. **(10 Marks)**

7 a. Discuss in detail on sources of finance for small scale industry. **(10 Marks)**
b. Elaborate on objectives and functions of SIDBI. **(10 Marks)**

8 a. Define project, discuss at least four criteria to select a project. **(10 Marks)**
b. What are the needs of network techniques in project? Explain two types of network techniques in project implementation. **(10 Marks)**

* * * * *

USN | | | | | | | | | | |

10ME52

Fifth Semester B.E. Degree Examination, June/July 2016
Design of Machine Elements – I

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of design data handbook is permitted.***
3. ***Assume missing data if any suitably.***

PART – A

1 a. Explain the phase of Design with neat flow Diagram. **(06 Marks)**

b. What are the codes and standards? **(04 Marks)**

c. Stresses in a two dimensional stressed body as in the Fig Q1(c), Determine :
i) Principal stresses and their direction
ii) Maximum shear stress and their planes. **(10 Marks)**

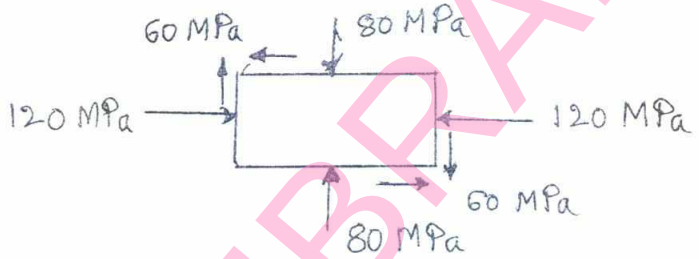

Fig. Q1(c)

2 a. What is the stress concentration factor? What are the methods to determine stress concentration factor? **(06 Marks)**

b. A Load of 4000N on a simply supported shaft as in the Fig. Q2(b). Find the radius of the fillet at left side of the shaft, if maximum stress at left fillet is same as that of right. Take q = 0.95. **(14 Marks)**

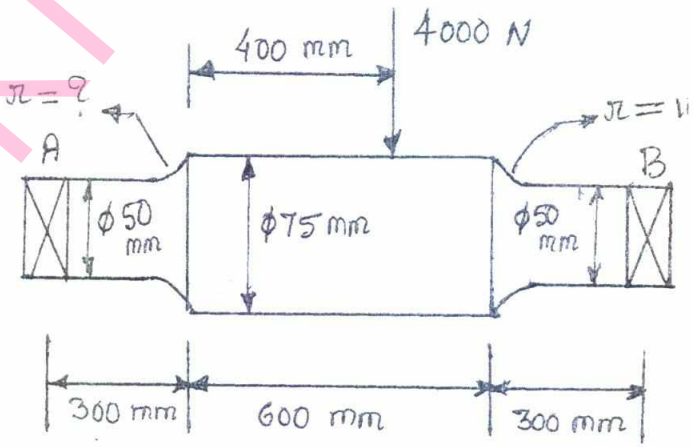

Fig. Q2(b)

3 a. List the factors effecting the endurance limit. **(06 Marks)**

b. Determine the Diameter "d" based on soderberg criterion for a machine member as shown in the Fig. Q3(b). The properties of the material used are, ultimate stress σ_u = 600MPa, yield stress σ_y = 400MPa, endurance stress σ_{en} = 300MPa, and yield shear stress τ_y = 200MPa. The size factor, surface factor are 0.9 and 0.85 respectively. The notch sensitivity factor is 0.92, and load factor for axial can be as 0.6 and factor of safety as 3. **(14 Marks)**

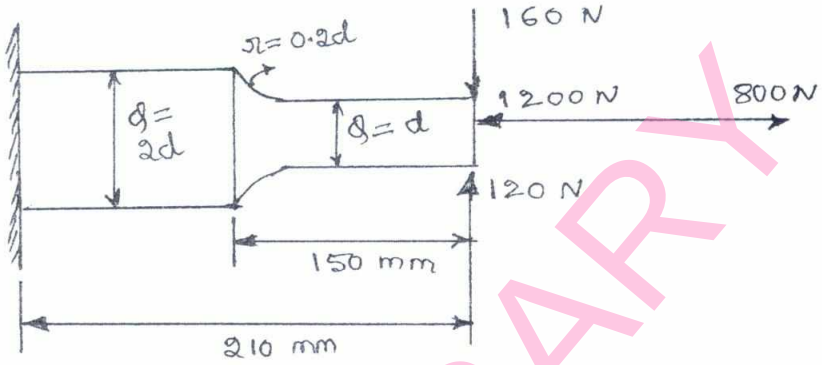

Fig. Q3 (b)

4 a. Explain the stresses in the screw due to the static loading. **(10 Marks)**

b. A flanged Bearing as in the Fig. Q4(b) having allowable stresses in shear in Bolt material is 50N/mm^2. Determine size of the Bolt. **(10 Marks)**

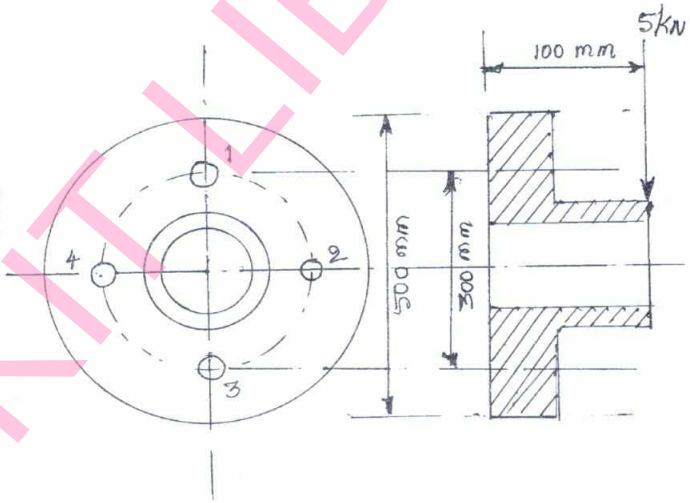

Fig. Q4(b)

PART – B

5 A commercial steel shaft with allowable shear stress 40MPa, with shock factors for Bending and twisting is 1.5 and 1 respectively. The length of the shaft between bearings is 600mm carries a pulley of 400mm diameter having weight 400N, mounted in middle of the shaft. Shaft receives 40kW at 600rpm by a flat belt drive. Power from shaft is transmitted through another pulley of diameter 600mm weighing 600N over hanging the right hand bearing by 200mm. The Belt drives on pulleys are right angles to each other. Take ratios of Belt tensions as 3, determine the diameter of the shaft. Use ASME code for shaft Design. **(20 Marks)**

6 a. Two rods made up of plain carbon steel having, tensile stress σ_{yt} = 380 N/mm^2 are to be connected by means of cottar joint. Diameter of each rod is 50mm and cotter is made up of steel of 15mm thickness. Calculate dimensions of the socket end, making following assumptions.

i) Yield strength in compression is twice of tensile yield strength.

ii) Yield strength in shear is 50% of tensile yield strength. Take factor of safety as 6.

(10 Marks)

b. A 19kW, 1440 rpm motor has a steel shaft, extension of the shaft is 75mm. Diameter of the shaft is 45 mm. Maximum torques is 3.5 times the average torque and yield shear stress is 54MPa, crushing stress is 108MPa for key material. Design the key and also determine effect of key way. Take factor of safety as 2.5. **(10 Marks)**

7 a. Design a Triple Riveted lap joint of zig-zag type for a pressure vessel of 1.5m diameter. The maximum pressure inside the vessel is 1.5MPa. Allowable stresses in tension, crushing and shear are 100MPa, 125MPa and 75MPa respectively. **(10 Marks)**

b. A plate of 80mm wide and 15mm thick is to be joined with another plate by a single transverse weld and a double parallel weld. Determine length of the parallel weld if joint is subjected to both static and fatigue loading. Take tensile stress σ_t = 90 MPa, Shear stress τ = 55 MPa as allowable stresses and stress concentration factor as 1.5 for transverse weld and 2.7 for parallel weld. **(10 Marks)**

8 a. Obtain the expression for Torque required to lift the load on a square threaded screw. **(08 Marks)**

b. A square threaded power screw has nominal diameter of 30mm and a pitch of 6mm with Double start. Load on screw is 6kN and mean diameter of thrust collar is 40mm. The co-efficient of friction for screw is 0.1 and for collar is 0.09. Determine a) torque required to rotate the screw against the load. b) Torque required to rotate the screw with the load c) overall efficiency d) Is the screw self locking? **(12 Marks)**

* * * * *

USN | | | | | | | | | | |

10ME53

Fifth Semester B.E. Degree Examination, June/July 2016
Energy Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Use of Steam table with Molier chart permitted.***

PART – A

1 a. Explain with a neat sketch, working of multiretort stocker and their advantages. **(10 Marks)**
b. Explain pneumatic or vacuum extraction ash handling system. **(06 Marks)**
c. What are the advantages of liquid fuels used in thermal power plants? **(04 Marks)**

2 a. With a neat sketch, explain the working of Schmidt – Hartman Boiler. **(08 Marks)**
b. What are the different types of cooling ponds and cooling towers? **(08 Marks)**
c. Explain the comparisons between forced and induced draughts. **(04 Marks)**

3 a. Classify the fuel storage and supply systems used in a diesel power plant. **(08 Marks)**
b. With a neat diagram, explain the working of a diesel power plant. **(08 Marks)**
c. What are the outstanding features of a diesel power plant over thermal power plant? **(04 Marks)**

4 a. Explain water hammer and surge tanks. What are the different types of surge tanks? Brief with neat sketches. **(08 Marks)**
b. Define the term Hydrograph and Unit Hydrographs. **(06 Marks)**
c. A catchment area of the dam used for hydroelectric station is 250 km^2. The annual rainfall is 125cm. If 70% of water is used for power generation in the dam, calculate the capacity of power plant in MW. Assume that the turbine efficiency is 90% and generator efficiency is 95%. Neglect the losses. **(06 Marks)**

PART – B

5 a. With a neat sketch, explain the working of a fast breader reactor and write the advantages and disadvantages. **(08 Marks)**
b. What are the general components of nuclear reactor? **(08 Marks)**
c. Explain the terms Nuclear Fusion and Nuclear Fission reaction. **(04 Marks)**

6 a. What is Flat Plate Collector? Write a brief description of Liquid collector. **(08 Marks)**
b. Write with a neat sketch, the working of a Horizontal axial machines. **(08 Marks)**
c. Derive an expression for overall conversion efficiency and coefficient of performance in terms of velocity of blade element. **(04 Marks)**

7 a. What are the components of a tidal power plant? Brief each. **(08 Marks)**
b. A hot water geothermal plant of the total flow type receives water at 225^{0}C. The pressure at the turbine inlet is 10.5 kg/cm^2. The plant uses a direct contact condenser that operates at 0.35 kg/cm^2. The turbine has a polytrophic efficiency of 0.65 for a cycle net output of 10MW. Calculate by using stream table and Molier chart.
(i) The hot water flow in kg/hr.
(ii) The condenser cooling water flow in kg/hr at water temperature at 27°C.
(iii) The cycle efficiency. (iv) The plant heat rate. **(08 Marks)**
c. Write the advantages and disadvantages of tidal power generation. **(04 Marks)**

8 a. Explain photosynthesis with example. **(08 Marks)**
b. With a neat diagram, explain the working of continuous and batch type Biogas plants. **(08 Marks)**
c. Write the classification of Biomass gasifiers. **(04 Marks)**

*****

USN | | | | | | | | | | |

10ME54

Fifth Semester B.E. Degree Examination, June/July 2016
Dynamics of Machines

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Discuss the equilibrium of the following systems :
i) Two force members ii) Three force members iii) Member with two forces and a torque. **(09 Marks)**

b. With usual notations, explain the principle of virtual work, considering a slider crank mechanism. **(11 Marks)**

2 a. Discuss the following terms : i) Turning moment diagram ii) Co-efficient of fluctuation of energy iii) Co-efficient of fluctuation of speed. **(06 Marks)**

b. The turning moment diagram for an engine consists of 2 Isosceles triangles. Maximum height of each triangle represents turning moment 1000Nm. The base of each triangle = π radians. If the engine runs 200 rpm and total fluctuation of speed is not to exceed 3% find :
i) Power of the engine.
ii) Mass of rim type fly wheel concentrated at 0.25m, radius neglecting the effect of arms and boss. **(14 Marks)**

3 a. Derive an expression of total frictional torque for a Flat collar bearing subjected to uniform pressure. **(08 Marks)**

b. A belt which is embracing 165^0 of a pulley of effective diameter 1000mm is transmitting 10kW. The pulley is running at 250 rpm. The coefficient of friction is 0.3. Mass of belt material is $0.0012 gm/mm^3$, Thickness of belt = 10mm. Considering centrifugal tension, find width of belt. Safe working stress is 1.5MPa. Also determine the Initial tension in the belt drive. **(12 Marks)**

4 a. What do you mean by static balancing and dynamic balancing? **(04 Marks)**

b. A rotating shaft carries four radial masses A = 8kg, B, C = 6kg, D = 5kg. The mass centres are 30, 40, 40 and 50mm respectively from the axis of shaft. The axial distance between the planes of rotation of A and B is 400mm and between B and C is 500mm. The masses A and C are at right angles to each other. Find for a complete balance i) the angle of the masses B and D from mass A ii) the axial distance between the planes of rotation of C and D and iii) the magnitude of mass B. **(16 Marks)**

PART – B

5 The cranks and connecting rod of a 4 cylinder in line engine running at 1800 rpm are 50mm, 250mm each respectively and the cylinders are spaced 150mm apart. If the cylinders are numbered 1 to 4 in sequence from one end and the cranks appear at intervals of 90^0 in an end view in the order 1-4-2-3. The reciprocating mass corresponding to each cylinder is 1.5kg. Determine i) Unbalanced primary and secondary forces if any ii) Unbalanced primary and secondary couples with reference to central plane of engine. **(20 Marks)**

6 a. Explain the terms Sensitiveness , Stability , Effort and Power of a governor. **(08 Marks)**

b. The length of upper arm and lower arms of a porter governor are 200mm and 250mm respectively. Both the arms are pivoted to the axis of rotation. The central load is 150N, the weight of each ball is 20N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30N at the sleeve. If the limiting inclinations of the upper arm to the vertical are 30^0 and 40^0, determine the range of speed of the governor. **(12 Marks)**

7 a. Derive an expression for the gyroscopic couple. **(05 Marks)**

b. The motor of a marine having a mass of 1000 kg and radius of gyration 300mm rotates at 1550 rpm clockwise when looking from the bow. Determine the gyroscopic couple and its effect on the ship in the following cases :

i) When the ship pitches with an angular velocity of 1 rad/sec when the bow
   a) Rising b) Falling.

ii) When the ship is speeding at 40km/hr and takes a right turn in a circular path of 200m radius.

iii) When the ship rolls at certain instant, it has an angular velocity 0.5 rad/sec when viewed from the stern. **(15 Marks)**

8 The following data relate to a symmetrical circular cam operating on a flat faced follower. Least radius = 25mm , Nose radius = 8mm , Lift of the valve = 10mm , Angle of action of cam = 120^0 Cam shift speed = 1000 rpm. Determine

i) Flank radius ii) Maximum velocity iii) Maximum acceleration iv) maximum retardation. If the mass of the follower and valve with which it is in contact is 4 kg , find the minimum force exerted by the spring to overcome the inertia of the moving parts. **(20 Marks)**

*****

USN | | | | | | | | | | |

10ME56

Fifth Semester B.E. Degree Examination, June/July 2016
Turbomachines

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of Steam table and thermodynamic data handbook is permitted.

PART – A

1 a. Explain any six major differences between turbomachines and positive displacement machines. **(06 Marks)**

b. What are unit quantities? Derive the expressions to each of them. **(06 Marks)**

c. The following data were obtained from the main characteristics of a Kaplan turbine of runner diameter 1 m. $P_u = 30.695$, $Q_u = 108.6$, $N_u = 63.6$. Estimate (i) The runner diameter (ii) The discharge (iii) The speed of a similar runner working under a head of 30 m and developing 2000 kW. Also (iv) determine the specific speed of the runner. **(08 Marks)**

2 a. Define the polytropic efficiency of a turbine. Draw the T-S diagram and show that the polytropic efficiency is given by

$$\eta_p = \left[\frac{n-1}{n}\right]\left[\frac{\gamma}{\gamma-1}\right],$$

where n = Index of polytropic process, γ = Ratio of specific heats. **(10 Marks)**

b. Air flows through an air turbine where its stagnation pressure is reduced in the ratio 5:1. The total-to-total efficiency is 80%. The air flow is 5 kg/s. If the total power output is 500 kW, find (i) inlet total temperature (ii) actual exit total temperature (iii) actual exit static temperature if the flow velocity is 100 m/s (iv) total-to-static efficiency. **(10 Marks)**

3 a. Obtain an expression as shown below for energy transfer and degree of reaction as a function of discharge blade angle β_2 for a turbomachine. Make the following assumptions: (i) $u_2 = 2u_1$, (ii) Constant radial velocity, (iii) No whirl velocity at inlet and inlet blade angle 45°.

$$R = \frac{2 + \cot\beta_2}{4}$$

(10 Marks)

b. In an axial flow turbine, the discharge blade angles are 20° each, for both the stator and the rotor. The steam speed at the exit of the fixed blade is 140 m/s. The ration of $\frac{V_a}{u} = 0.7$ at the entry and 0.76 at the exit of the rotor blade. Find (i) the inlet rotor blade angle, (ii) the power developed by the blade ring for a mass flow rate of 2.6 kg/s, (iii) Degree of reaction. **(10 Marks)**

4 a. With the help of inlet and outlet velocity diagrams, show that the degree of reaction for an axial flow compressor is given by

$$R = \frac{V_a}{2U}\left[\cot\beta_1 + \cot\beta_2\right]$$

where, V_a = axial flow velocity, u = blade velocity, β_1 and β_2 are the vanes angles of inlet and outlet. **(10 Marks)**

b. A centrifugal pump delivers water against a head of 25 m. The radial velocity of flow is 3.5 m/s and is constant, the flow rate of water is 0.05 m^3/s. The blades are radial at tip and pump runs at 1500 rpm. Determine (i) Diameter at tip, (ii) Width of blade at tip, (iii) Inlet diffuser angle at impeller exit. **(10 Marks)**

PART – B

5 a. With a neat sketch, explain the pressure-velocity compounding of steam turbine. **(08 Marks)**

b. In a Curtis stage with two rows of moving blades the rotor are equiangular. The first rotor has angle of 29° each while second rotor has angle of 32° each. The velocity of steam at the exit of nozzle is 530 m/s and the blade coefficients are 0.9 in the first, 0.95 in the stator and in the second rotor. If the absolute velocity at the stage exit should be axial, find (i) Mean blade speed (ii) The rotor efficiency (iii) The power output for a flow rate of 32 kg/s. **(12 Marks)**

6 a. Show that for a Pelton turbine the maximum hydraulic efficiency is given by

$$\eta_{max} = \frac{1 + C_b \cos\beta_2}{2}$$

where C_b is blade velocity co-efficient and β_2 is blade discharge angle. **(08 Marks)**

b. Explain the function of a draft tube and mention its types. **(04 Marks)**

c. In a Francis turbine, the discharge is radial, the blade speed at inlet is 25 m/s. At the inlet tangential component of velocity is 18 m/s. The radial velocity of flow is constant and equal to 2.5 m/s. Water flows at the rate of 0.8 m^3/s. The utilization factor is 0.82. Find (i) Euler's head (ii) Power developed (iii) Inlet blade angle (iv) Degree of reaction (R). Draw the velocity triangles. **(08 Marks)**

7 a. What are the applications of multi-stage centrifugal pumps? With a neat sketch, explain centrifugal pumps in series and parallel. **(08 Marks)**

b. Explain the phenomenon of cavitation in centrifugal pump. **(04 Marks)**

c. A centrifugal pump impeller has radial vanes from inner radius of 8 cm to outer radius 24 cm. The width of the impeller is constant and is 6 cm between the shrouds. If the speed is 1500 rpm and the discharge is 250 lit/s. Find (i) change in enthalpy (ii) The outlet pressure if inlet pressure is 0.8 kPa and water flow is outward. **(08 Marks)**

8 a. Define the following terms of centrifugal compressor:
(i) Slip factor (ii) Power factor (iii) Pressure coefficient. **(06 Marks)**

b. Explain the phenomenon of surging in centrifugal compressor. **(04 Marks)**

c. The speed of an axial flow compressor is 15,000 rpm. The mean diameter is 0.6 m. The axial velocity is constant and is 225 m/s. The velocity of whirl at inlet is 85 m/s. The work done is 45 kJ/kg of air. The inlet conditions are 1 bar and 300 K. Assume a stage efficiency of 0.89. Calculate (i) Fluid deflection angle, (ii) Pressure ratio, (iii) Degree of reaction, (iv) Mass flow rate of air. Power developed is 425 kW. **(10 Marks)**

* * * * *