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10AL51

Fifth Semester B.E. Degree Examination, June / July 2014
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. What are the characteristics of management? Explain. **(10 Marks)**
b. Distinguish between management and administration. **(05 Marks)**
c. List the contribution of F.B. Gilberth. **(05 Marks)**

2 a. What are the characteristics of planning? Briefly explain each component. **(10 Marks)**
b. What are the advantages of objectives? **(05 Marks)**
c. What are the important characteristics of decision making? **(05 Marks)**

3 a. What are the principles of organization? Explain each in brief. **(10 Marks)**
b. What are the sources of recruitment? **(05 Marks)**
c. What are the main features of staffing? **(05 Marks)**

4 a. Define leadership. What are the basic styles of leadership? Explain each in brief. **(10 Marks)**
b. What are the features of motivation? **(05 Marks)**
c. Explain McGregor's theory X and theory Y. **(05 Marks)**

PART – B

5 a. What are the major characteristics of an entrepreneur? Explain each in brief. **(07 Marks)**
b. How does an entrepreneur differ from a manager? Explain. **(06 Marks)**
c. In the Indian context, explain the specific role that an entrepreneur has fulfilled in the economic development of the country. **(07 Marks)**

6 a. What are the salient features of new small enterprise policy 1991? **(07 Marks)**
b. What are the characteristics of SSI? **(06 Marks)**
c. What are the major effects of WTO/GATT on Indian SSI? **(07 Marks)**

7 a. Explain DIC single window agency. **(07 Marks)**
b. What are the objectives and functions of SIDBI? **(06 Marks)**
c. What are the functions of KSFC and TECSOK? **(07 Marks)**

8 a. Explain the various guidelines provided by the planning commission for preparation of project report. **(07 Marks)**
b. What are the major errors generally made by entrepreneurs during formulating project report? **(06 Marks)**
c. What are the differences between PERT and CPM? **(07 Marks)**

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10ME52

Fifth Semester B.E. Degree Examination, June/July 2014
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.

PART – A

1 a. Draw the stress-strain diagrams for a ductile material and a brittle material and show the salient points on them. **(05 Marks)**

b. For the stress-element shown in Fig.Q1(b), find the principal stresses and directions. **(06 Marks)**

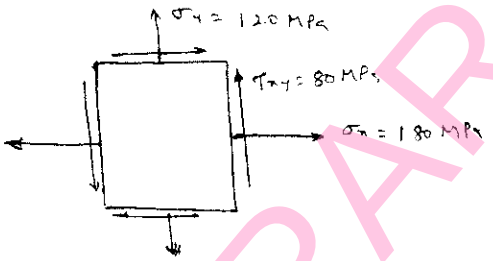


Fig.Q1(b)

c. Determine the maximum normal stress and shear stress for the figure shown in Fig.Q1(c). **(09 Marks)**

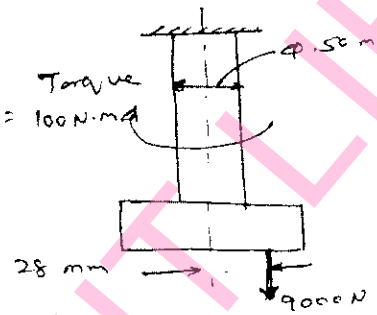


Fig.Q1(c)

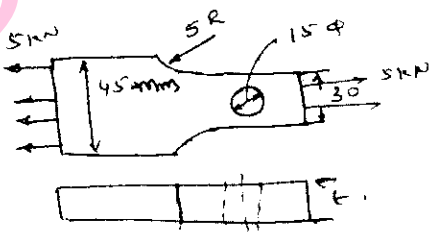


Fig.Q2(b)

2 a. Explain the following theories of failure:
(i) Maximum shear stress theory (ii) Distortion energy theory. **(05 Marks)**

b. A flat plate subjected to a tensile force of 5 kN is shown in Fig.Q2(b). The plate material is grey cast iron having $\sigma_{ultimate}$ = 200 MPa. Determine the thickness of the plate. Factor of safety is 2.5. **(08 Marks)**

c. A weight 600 N drops through a height of 20 mm and impacts the center of 300 mm long simply supported circular cross section beam. Find the diameter of the beam and the maximum deflection, if the allowable stress is limited to 90 MPa. Neglect the inertia effect and take E = 200 GPa. **(07 Marks)**

3 a. Derive Soderberg's equation for ductile material. **(05 Marks)**

b. A hot rolled steel rod is subjected to a torsional load that varies from +330 N-m clockwise to 110 N-m counter clockwise and an applied bending moment varies from +440 N-m to – 220 N-m The rod is of uniform cross-section. Determine the required rod diameter. The material has an ultimate tensile strength of 550 MPa and a yield strength of 410 MPa. Design based on a factor of safety of 1.5. Take the endurance limit as half the ultimate strength. **(15 Marks)**

4 a. Explain the stresses induced in a screw fastening subjected to static, dynamic and impact loading. **(12 Marks)**

b. A bolt is subjected to initial loading of 5 kN and final tensile load of 9 kN. Determine the size of the bolt, if the allowable stress is 80 MPa and K = 0.05. **(08 Marks)**

PART – B

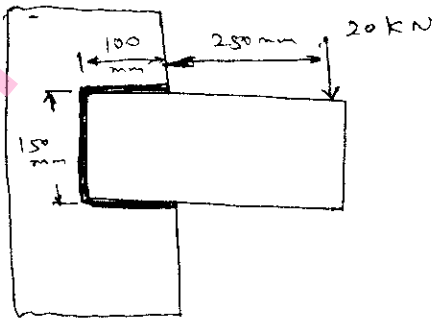
5 A horizontal steel shaft, supported on bearings "A" at the left end and "B" at the right end, carries two gears "C" & "D", located at distances 250 mm and 400 mm respectively, from the center lines of left and right end bearings. The pitch diameter of gear C is 600 mm and that of gear D is 200 mm. The pressure angle is 20°. The distance between the center lines of the bearings is 2400 mm. The shaft transmits 20 kW power at 120 rpm. The power is delivered to the shaft at gear C and is taken out at gear D in such a manner that the tooth pressure F_C and F_D of gears C and D act vertically downwards. Find the diameter of the shaft, if the working stresses are100 MPa in tension and 56 MPa in shear. The gear C and D weigh 950 N and 350 N respectively. Take $C_m = 1.5$ and $C_T = 1.2$. **(20 Marks)**

6 a. Design a cotter joint to sustain an axial load of 100 kN. Allowable stress in tension 80 MPa. Allowable stress in compression 120 MPa. Allowable shear stress 60 MPa. Allowable bearing pressure 40 MPa. **(10 Marks)**

b. Design a flanged coupling to connect the shafts of motor and pump transmitting 15 kW power at 600 rpm. Select C40 steel for shaft and C_{35} steel for bolts, with factor of safety = 2. Use allowable shear stress for Cast-Iron flanges = 15 N/mm^2; $\sigma_{allowable}$ = 162 N/mm^2 ; and $\tau_{allowable}$ = 81 N/mm^2 for bolts σ = 152 N/mm^2 and τ = 76 N/mm^2. **(10 Marks)**

7 a. Design a double riveted lap joint with chain rivetting for a mild steel plates of 20 mm thick taking the allowable values of stress in shear, tension and compression to 60, 90 and 120 MPa respectively. **(10 Marks)**

b. Determine the size of the weld for a welded joint loaded, if the permissible shear stress for the weld material is 75 MPa. **(10 Marks)**



8 a. Explain self locking and overhauling in power screws. **(05 Marks)**

b. A single start square-threaded power screw is used to raise a load of 120 kN. The screw has a mean diameter of 24 mm and four threads per 24 mm length. The mean collar diameter is 40 mm. The coefficient of friction is estimated as 0.1 for both the thread and the collar.

(i) Determine the major diameter of the screw.

(ii) Estimate the screw torque required to raise the load.

(iii) Estimate overall efficiency.

(iv) If collar friction is eliminated, what minimum value of thread coefficient is needed to prevent the screw from overhauling? **(15 Marks)**

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10ME53

Fifth Semester B.E. Degree Examination, June / July 2014
Energy Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Assume missing data, if any, suitably.***

PART - A

1 a. With a neat sketch, explain the working of spreader stroker. State the limitations of it. **(10 Marks)**

b. Draw a line diagram of Pneumatic ash handling system and explain its working. Mention its advantages. **(10 Marks)**

2 a. What are the advantages and disadvantages of high pressure boilers? With a neat sketch, explain the working of Benson boiler. **(10 Marks)**

b. What is draught? Mention types of draught and explain any one type, with neat sketch. **(10 Marks)**

3 a. Draw a line diagram to shown the layout of diesel power plant. Describe it in brief. **(10 Marks)**

b. State the applications of diesel engines in power fluid. List the advantages and disadvantages of diesel power plant. **(10 Marks)**

4 a. How are the hydro – electric power plant classified? With a neat sketch, explain the pumped storage plant. **(10 Marks)**

b. At a particular site, the mean monthly discharges (in millions of m^3) of a river in 12 months from January to December are 30, 25, 20, 0, 10, 50, 80, 100, 110, 65, 45 and 30 respectively. Draw the hydrograph and flow duration curve and find mean flow. Also find the power available at mean flow. If the head available is 90m and the overall efficiency of generation is 85%. Assume each month of 30 days. **(10 Marks)**

PART - B

5 a. Draw a schematic diagram of a PWR, label all the parts. State the function of each component. **(10 Marks)**

b. Explain the following : i) Reactor shielding ii) Radio active waste disposal. **(10 Marks)**

6 a. With a neat sketch, explain the working of an instrument used to measure global radiation of solar energy. **(10 Marks)**

b. With a neat sketch, explain solar pond electric power plant. Mention applications of solar pond. **(10 Marks)**

7 a. Explain the principle of working of OTEC. Explain with a neat sketch, Rankine cycle OTEC plant. **(10 Marks)**

b. i) What are the factors considered for selecting a suitable site for tidal power plant? **(05 Marks)**

ii) With a neat sketch, explain the working of "Hot dry rock" geothermal plant. **(05 Marks)**

8 a. What is meant by anaerobic digestion? What are the factors which affect bio-digestion? Explain in brief. **(10 Marks)**

b. How are gasifiers classified? With a schematic diagram, explain the working of down draft gasifier. **(10 Marks)**

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10ME54

Fifth Semester B.E. Degree Examination, June/July 2014
Dynamics of Machines

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain equilibrium with respect to two force and three force members. **(04 Marks)**

b. A four bar mechanism shown in Fig.Q1(b) is acted upon by a force P = 100 N at 120° on link CD. The dimensions of various links are AB = 40 mm, BC = 60 mm, CD = 50 mm, AD = 30 mm, DE = 20 mm. Determine the input torque on link AB for static equilibrium. **(16 Marks)**

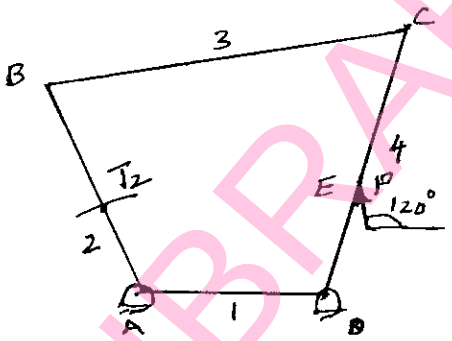

Fig.Q1(b)

2 a. Briefly discuss the following :
(i) D'Alembert's principle (ii) Dynamically equivalent system. **(06 Marks)**

b. The turning moment diagram for a four stroke engine may be assumed for simplicity to be represented by four isosceles triangles. The areas of the triangles are suction = – 0.5cm^2 ; Compression = – 2.1cm^2 ; Expansion = +8.1cm^2 and exhaust = – 0.8cm^2. 1 cm^2 area represents 1400 N-m of work. Determine the mass moment of inertia of the flywheel to keep the fluctuation of speed within 1% of mean speed, if the mean speed is 400 rpm. **(14 Marks)**

3 a. State the laws of dynamic friction. **(04 Marks)**

b. Derive an expression for frictional torque in a flat collar bearing assuming uniform pressure. **(06 Marks)**

c. A leather belt is required to transmit 7.5 kW from a pulley 1.2 m in diameter, running at 250 rpm, the angle of contact is 165° and μ = 0.3. If the safe working stress for the leather belt is 1.5 MPa and density of leather is 1000 kg/m^3 and thickness of belt is 10 mm, determine the width of belt taking centrifugal tension into account. **(10 Marks)**

4 a. Briefly explain the static and dynamic balancing. **(04 Marks)**

b. A 3.6 m long shaft carries three pulleys, two at its two ends and the third at the midpoint. The two end pulleys have masses 79 kg and 40 kg with their radii 3 mm and 5 mm from axis of shaft respectively. The middle pulley has a mass of 50 kg with radius 8 mm. The pulley are so keyed to the shaft that the assembly is in static balance. The shaft rotates at 300 rpm in two bearings 2.4 m apart with equal overhangs on either side. Determine
(i) Relative angular positions of pulleys.
(ii) Dynamic reaction on the two bearings. **(16 Marks)**

PART – B

5 a. With usual notations, explain primary and secondary unbalanced forces of reciprocating masses. **(05 Marks)**

b. A five cylinder inline engine running at 500 rpm has successive cranks at 144° apart. The distance between the cylinder line is 300 mm. Piston stroke is 240 mm, length of connecting rod is 480 mm. Examine the engine for balance of primary and secondary forces and couples. Find the maximum value of these and position of central crank at which these maximum values occur. The reciprocating mass for each cylinder is 150 N. **(15 Marks)**

6 a. Define the following :
(i) Sensitiveness (ii) Hunting (iii) Governer power (iv) Stability
(v) Isochronous governer. **(10 Marks)**

b. A portor governer has all four arms 300 mm long, the upper arms are pivoted on axis of rotation and lower arms are attached to the sleeve at a distance 35 mm from the axis. The mass of each ball is 7 kg and the load on the sleeve is 540 N. Determine the equilibrium speed for two extreme radii of 200 mm and 260 mm of rotation of governer balls. **(10 Marks)**

7 a. With usual notations and diagram, derive an expression for the gyroscopic couple produced by a rotating disc. **(08 Marks)**

b. Each road wheel of motor cycle has a moment of inertia of 2 kg-m^2. The rotating parts of the engine of the motor cycle, has a M.I. of 0.2 kg-m^2. The speed of the engine is 5 times the speed of the wheel and is in the same sense. The mass of the motor cycle with rider is 200 kg and its C.G is 500 mm above ground level. The diameter of the wheel is 500 mm, the motor cycle is travelling at 15 m/s on a curve of 30 m radius. Determine
(i) Gyroscopic couple, centrifugal couple, over turning and balancing couple in terms of angle of heel.
(ii) Angle of heel. **(12 Marks)**

8 A straight sided cam has both sides tangential to the base circle, with a radius of 25 mm. The total angle of action is 120°, A lift of 10 mm is given to the roller 20 mm diameter, the centre of which moves along a straight line, passing through the axis of the cam. The crank shaft has a speed of 240 rpm. Determine
(i) The radius of the nose arc.
(ii) The velocity and acceleration of the roller centre when the roller in contact with the cam at the end of one of the straight flanks adjacent to the nose and
(iii) The acceleration of roller centre at peak. **(20 Marks)**

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10ME55

Fifth Semester B.E. Degree Examination, June / July 2014
Manufacturing Process - III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Compare Hot working and Cold working processes. **(08 Marks)**

b. A Copper wire has a nominal breaking strength of 300MPa. Its ductility is 77% reduction of area. Calculate the true stress for fracture. **(05 Marks)**

c. Derive the equation for principal stresses. **(07 Marks)**

2 a. Discuss the effect of : i) Friction ii) Lubrication on metal working process. **(08 Marks)**

b. Write a note on :
i) Deformation zone geometry ii) Workability of materials iii) Residual stresses in wrought products. **(12 Marks)**

3 a. Classify and explain the various forging process, with neat sketches. **(08 Marks)**

b. A circular bar of 150mm dia and 100mm height is forged at room temperature between two flat dies to 25mm height. Determine the yield strength, average die pressure, as well as maximum die pressures at the beginning of plastic deformation and at the end of compression. The yield strength of the material is given as $\sigma = 100.0\ (0.0085 + \varepsilon)^{0.39}$ N/mm^2 and $\mu = 0.1$. **(12 Marks)**

4 a. Explain the commonly used rolling mill arrangements in today's manufacturing industry. **(10 Marks)**

b. A roll mill has roll dia of 850mm. Calculate the maximum reduction possible in this mill if the coefficient of friction is 0.3. Determine the rolling load required to obtain 25% reduction of a metal strip of 35mm thickness using the same rolling mill, given the average yield strength of the metal as 180MPa and strip width as 690mm. **(10 Marks)**

PART – B

5 a. Discuss redundant work and its estimation in drawing. **(10 Marks)**

b. List and explain a few important process variables that affect the drawing force in wire drawing process. **(06 Marks)**

c. Explain tube drawing with a floating mandrel. **(04 Marks)**

6 a. Explain the sketches : i) Indirect extrusion ii) Hydro static extrusion. **(08 Marks)**

b. Write a note on extrusion dies. **(04 Marks)**

c. It is required to extrude an Aluminium alloy at 380^{0}C through square dies from 140mm to 50mm diameter. The ram speed is 40mm/sec and the flow stress of the material at 380^{0}C is 240MPa. Determine the extrusion force with the following data. Length of the billet is 450mm , Semi – die angle is 45^0 : Coefficient of friction between work surface is 0.15. **(08 Marks)**

7 a. Explain the types of multi operation dies, with neat sketches. **(12 Marks)**

b. Calculate the maximum punch force and the work done required to blank a steel washer 44.45mm outside dia and 22.3mm inside dia from a 1.59mm thick rectangular sheet with an ultimate shear stress of 432N/mm^2 and the % penetration is 20%. **(08 Marks)**

8 a. Discuss any 3 methods of production of powders. **(06 Marks)**

b. List the advantages and disadvantages of HERF. **(08 Marks)**

c. Explain : i) Electromagnetic forming ii) Hot Isostatic Pressing. **(06 Marks)**

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10ME56

Fifth Semester B.E. Degree Examination, June/July 2014

Turbomachines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define turbomachine. Classify them on basis of work transfer. **(04 Marks)**

b. Define the following efficiencies of power absorbing turbomachines:
i) Total-to-total efficiency
ii) Static-to-static efficiency **(06 Marks)**

c. Explain specific speed and specific power. **(04 Marks)**

d. A model turbine 1 m in diameter acting under a head of 2 m runs at 150 rpm. Estimate the scale ratio if the prototype develops 20 MW under a head of 225 m with a specific speed of 100. **(06 Marks)**

2 a. Define polytropic efficiency of a compressor. **(04 Marks)**

b. What is reheat factor in a multistage turbine? Prove that R.F is greater than unity. **(08 Marks)**

c. In a three stage turbine the pressure ratio of each stage is 2 and the stage efficiency is 75%. Calculate the overall efficiency and reheat factor. **(08 Marks)**

3 a. Derive an alternate form of Euler's turbine equation and explain the significance of each energy components. **(10 Marks)**

b. At a 50% reaction stage axial flow turbine, the mean blade diameter is 0.60 mtr. The maximum utilization factor is 0.85 and steam flow rate is 12 kg/s. Calculate the inlet and outlet absolute velocities and power developed if the speed is 2500 rpm. **(10 Marks)**

4 a. Derive an expression of theoretical head capacity relationship of radial outward flow devices (centrifugal machines). **(10 Marks)**

b. An inward flow reaction turbine has outer and inner diameter wheel as 1 m and 0.5 m respectively. The vanes are radial at inlet and discharge is radial at outlet and fluid inters the vanes at an angle of 10°. Assuming the velocity of flow to be constant and equal to 3 m/sec. Find: i) Speed of wheel. ii) Vane angle at outlet. iii) Degree of reaction. **(10 Marks)**

PART – B

5 a. What is compounding or staging? Name the different compounding methods. **(04 Marks)**

b. The data pertaining to an impulse turbine is as follows:
Steam velocity = 500 m/sec, blade speed = 200 m/sec, exit angle at moving blade = 25° measured from tangential direction, nozzle angle = 20°. Neglecting the effect of friction when passing through blade passages. Calculate:
i) Inlet angle of moving blade
ii) Exit velocity and direction
iii) Work done per kg of steam
iv) Power developed
v) Diagram efficiency **(16 Marks)**

6 a. Obtain an expression for the workdone per second by water on the runner a pelton Wheel and Hydraulic efficiency. **(10 Marks)**

b. A Kaplan turbine has an outer diameter of 8m and inner diameter as 3m and developing 30,000 KW at 80 rpm under a head of 12 m. The discharge through the runner is 300 m^3/sec. If the hydraulic efficiency is 95%, determine:

i) Inlet and outlet blade angles
ii) Mechanical efficiency
iii) Overall efficiency **(10 Marks)**

7 a. Derive the expression for the minimum speed for starting a centrifugal pump. **(12 Marks)**

b. A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1200 rpm, works against a total head of 75 m. The velocity of flow through the impeller is constant and equal to 3m/sec. The vanes are setback at an angle of 30° at outlet. If the outlet diameter of the impeller is 60 cm and width at outlet is 5 cm, determine:

i) Vane angle at inlet
ii) Workdone per second by impeller
iii) Manometric efficiency **(08 Marks)**

8 a. Explain the phenomena of surging, stalling and chocking in centrifugal compressor stage. **(06 Marks)**

b. Draw velocity triangles at the entry and exit for the axial compressor stage. **(06 Marks)**

c. An axial compressor/blower supplies air to furnace at the rate of 3 kg/sec. The atmospheric conditions being 100 kPa and 310 K, the blower efficiency is 80% and mechanical efficiency is 85%. The power supplied to 30 kW. Estimate the overall efficiency and pressure developed in mm W.G. **(08 Marks)**

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