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10AL51

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. List its characteristics. **(04 Marks)**
b. What are the various roles of a manager? Explain. **(06 Marks)**
c. Explain (i) Systems approach (ii) contingency approach to Management. **(10 Marks)**

2 a. Define the term planning. Explain steps involved in planning. **(10 Marks)**
b. List the importance and purpose of planning process. **(06 Marks)**
c. Explain MBO and MBE. **(04 Marks)**

3 a. List and explain principles of organization. **(10 Marks)**
b. Explain selection and recruitment process. **(10 Marks)**

4 a. Explain the following theories of motivation:
(i) Maslow's Hierarchy of needs theory (ii) McGregor's theory (iii) 2 factor theory **(12 Marks)**
b. List the techniques of coordination. **(08 Marks)**

PART – B

5 a. Classify Entrepreneurs by providing an example for each type. **(10 Marks)**
b. What role does an entrepreneur play in economic development of a country? **(10 Marks)**

6 a. Explain the steps to start a SSI. **(08 Marks)**
b. List the advantages of a SSI. **(05 Marks)**
c. Explain effect of WTO/GATT on SSI. **(07 Marks)**

7 Explain the nature of support and functions of TECKSOK, KIADB, NSIC and KSFC for an entrepreneur. **(20 Marks)**

8 a. Why should feasibility study be conducted? Explain various types of feasibility study. **(12 Marks)**
b. Explain contents of a Project Report. **(08 Marks)**

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10ME52

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 hand book is permitted.***

PART – A

1 a. Draw the engineering stress – strain diagram and explain all the salient point marked on it. **(10 Marks)**

b. A point in a structural member subjected to plane stress is shown in Fig Q1(b). Determine the following :
i) Normal and tangential stress intensities on a plane inclined at 45°
ii) Principal stress and their directions. **(10 Marks)**

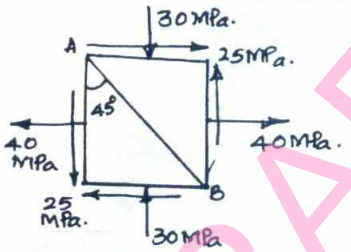

Fig Q1(b)

2 a. Define factor of safety and list four factors to be considered in the selection of factor of safety. **(04 Marks)**

b. Determine the torque transmitted by the stepped shaft shown in Fig Q2(b). If the maximum shear stress is limited to 60MPa **(08 Marks)**

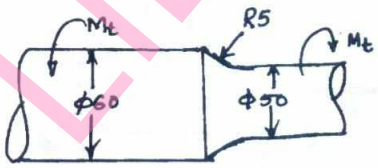

Fig Q2(b)

c. An unknown weight falls through 10mm on a collar rigidly attached to the lower end of a vertical bar 3m long and 600mm^2 in section. The maximum instantaneous extension is 2mm. What is the corresponding stress and the value of unknown weight. Take E = 206GPa. **(08 Marks)**

3 A steel cantilever member shown in Fig Q3 is subjected to an axial load that varies from 500N compression to 1000N tension and to a transverse load at its free end that varies from 100N up and 200N down. Determine the required diameter of the section using a factor of safety 2. The strength properties of the material are σ_u = 550MPa, σ_y = 480Mpa, σ_{-1} = 270MPa. Neglect the column action and notch effect. **(20 Marks)**

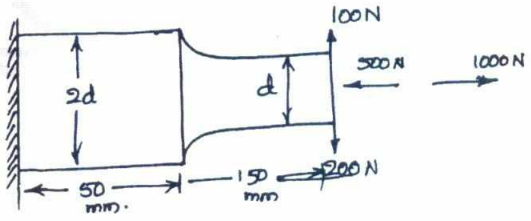

Fig Q3

4 a. Explain the types of stresses to be considered for design of bolts with static loading. **(10 Marks)**

b. An M 20 × 2 steel bolt of 100mm long is subjected to impact load. The energy absorbed by the bolt is 2 N-m.

i) Determine the stress in the shank of the bolt if there is no threaded portion between the nut and the bolt head.

ii) Determine the stress in the shank if the entire length of the bolt is threaded

Take E for steel = 206.8 GPA. **(10 Marks)**

PART – B

5 A shaft 600mm between bearings supports a 500mm diameter pulley 250mm to the right of the left hand bearing and the belt derives a pulley directly below another pulley 380mm dia is located 130mm to the right of the right hand bearing and the belt is driven from a pulley to the right horizontally. The coefficient of friction is 0.3 maximum tension in the belt is 5500N. Find the shaft diameter, the permissible normal and shear stresses are 56MPa and 42MPa respectively. Angle of wrap of belt on each pulley is 180°. **(20 Marks)**

6 a. Design a Knuckle joint to connect two mild steel rods to sustain an axial pull of 150kN. The pin and the rods are made of same material. Take working stresses in the material as 80MPa in tension, 40MPa in shear and 120MPa in crushing. **(10 Marks)**

b. Find the length and thickness of a sunk key for shaft of 100mm diameter. Assume that the shear resistance of the material of the key is the same as that of the shaft. Take the width of the key as 25mm and the shear stress is equal to 0.4 times the crushing stress. **(10 Marks)**

7 a. Explain in brief, the failures of Riveted joints. **(10 Marks)**

b. The Fig Q7(b) shows as horizontal steel bar 12mm thick, loaded in tension and welded to a vertical support. Find the load p that will induce a shear stress of 60MPa in the welds.

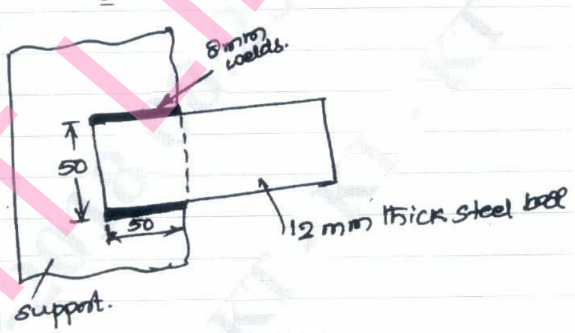

Fig Q7(b) **(10 Marks)**

8 a. Derive an expression for maximum efficiency of a square threaded screw and show that for self locking screw the efficiency is always < 50%. **(10 Marks)**

b. A double threaded power screw with trapezoidal ISO thread is used to raise a load of 300kN. The nominal diameter is 100mm and the pitch is 12mm. Take coefficient of friction is 0.15. Neglecting collar friction. Find :

i) Torque required to raise the load

ii) Torque required to lower the load

iii) Efficiency of the screw. **(10 Marks)**

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10ME53

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Energy Engineering

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With a neat sketch, explain the "Unit System" of handling pulverized coal. **(05 Marks)**

b. Explain the working of a Spreader Stoker, with a neat sketch. **(07 Marks)**

c. Briefly explain the various steps involved in coal handling. **(08 Marks)**

2 a. Explain the Benson Boiler, with neat sketch. **(06 Marks)**

b. What is the function of Air preheaters? How they are classified? List the principal benefits of preheating air. **(04 Marks)**

c. A boiler uses 2000 kg/hr of coal. The temperature of air supplied is 300K and the average temperature of the flue gas leaving the chimney is 650K. The 33m high steel chimney produces a draught of 20mm water columns. Determine i) the quantity of air supplied per kg of coal ii) the draught in terms of column of hot gases iii) the base diameter of the chimney, assuming that 10% of theoretical draught is used for creating flow velocity of gases through the chimney. **(10 Marks)**

3 a. With a neat sketch, explain the air exhaust system in diesel engines. What care must be taken while designing exhaust system? **(06 Marks)**

b. Explain different methods used in starting diesel engines. **(06 Marks)**

c. List the important functions of the lubrication system. With a neat sketch, explain any one type of wet sump, lubrication system used in IC engines. **(08 Marks)**

4 a. Explain pumped storage hydroelectric power plant, with a neat sketch. **(05 Marks)**

b. Explain the following terms related to hydroelectric power plant :
i) Water hammer ii) Surge tank. **(05 Marks)**

c. At a particular site of river for hydro power, the mean monthly discharge for 12 months from April 2009 to March 2010 is tabulated below.

Month	Discharge (Millions of m^3 per month)	Month	Discharge (Millions of m^3 per month)
April	250	October	1000
May	100	November	750
June	750	December	750
July	1250	January	500
August	1500	February	400
September	1200	March	300

i) Draw the hydrograph for the given discharges and find the average monthly flow.

ii) Draw the duration curve.

iii) The power available at the mean flow of water available head is 80 meters at the site and overall efficiency of the generation is 85%. Take 30 days in a month. **(10 Marks)**

PART – B

5 a. Explain the sodium – graphite nuclear reactor , with a neat sketch. **(08 Marks)**
b. Draw a neat diagram of Pressurised water reactor and list out its advantages and its disadvantages. **(07 Marks)**
c. Write a short note on Radioactive Waste Disposal. **(05 Marks)**

6 a. Explain the working of a solar cell with neat sketch. List the applications of solar photovoltaic system. **(09 Marks)**
b. Draw the block diagram, showing the basic components of Wind Energy Conversion System (WECS). Also list the disadvantages of WECS. **(07 Marks)**
c. Write short note on Solar Radiation measurement. **(04 Marks)**

7 a. With a schematic diagram, describe the working of a liquid – dominated binary fluid geothermal power plant. **(08 Marks)**
b. List the problem associate with ocean Thermal Energy Conversion. **(05 Marks)**
c. What are the different techniques of harnessing tidal energy? With neat sketch, explain tidal power plant with double basin operation. **(07 Marks)**

8 a. Explain the photosynthesis process. **(04 Marks)**
b. List the factors affecting biogas generation. **(04 Marks)**
c. Draw a neat sketch, showing the construction of a 'floating gas holder' type biogas plant. Mention its advantages. **(06 Marks)**
d. Explain down draft gasifier, with a neat sketch. **(06 Marks)**

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10ME54

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Dynamics of Machines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is the principle of virtual work? Explain. **(05 Marks)**

b. In a slider crank mechanism the crank is 100mm and the connecting rod is 300mm. A force of 2000N acts on piston the direction of which is towards crank shaft. If the Piston has moved such that the crank has made an angle of 60° from IDC, find the driving torque on the crank. **(15 Marks)**

2 a. Derive an equation for maximum fluctuation of energy of flywheel in terms of mean kinetic energy of coefficient of fluctuation of speed. **(06 Marks)**

b. A punching press required to punch 30mm diameter holes in a plate of 20mm thickness at the rate of 20 holes per minute. It requires 6 N-m of energy per mm^2 of sheared area. If punching takes place in $\frac{1}{10}$ of a second and the rpm of the flywheel varies from 160 to 140, determine the weight of flywheel having radius of gyration 1m. **(14 Marks)**

3 a. Derive an expression for centrifugal tension in a belt. **(06 Marks)**

b. A leather belt connects a 1.20m diameter pulley on a shaft running at 25r/s with another pulley running at 50r/s, the angle of lap on latter pulley being 150°. The maximum permissible load is 1200N and the coefficient of friction between the belt and pulley is 0.25. If the initial tension in the belt may have any value between 800N and 960N, what is the maximum power which the belt can transmit? **(14 Marks)**

4 a. Explain static and dynamic balancing. **(06 Marks)**

b. Four masses A, B, C and D are carried by rotating shaft at radii 10mm, 125mm, 200mm and 150mm respectively. The planes in which the masses revolve are spaced 600mm apart and the mass of B, C and D are 100kg, 50kg and 40kg respectively. Determine the required mass A and angular positions of the four masses so that the shaft is under complete balance. **(14 Marks)**

PART – B

5 a. What do you mean by primary and secondary unbalanced forces of reciprocating masses? Explain. **(06 Marks)**

b. The reciprocating mass per cylinder in a 60V twin cylinder engine is 1.5kg. The stroke is 100mm for each cylinder. If the engine runs at 1800rpm. Determine the maximum and minimum values of primary forces and find out the corresponding crank position. **(14 Marks)**

6 a. With usual notations derive an expression for the speed of porter governor. **(08 Marks)**

b. For a spring controlled Hartnell type governor, following data is obtained:

Mass of ball = 1.8kg
Length of vertical arm of bell crank lever = 87.5mm
Length of other arms of bell crank lever = 100mm

The speeds corresponding to radii of rotations of 120mm and 130mm are 296 and 304 rpm respectively. Determine the stiffness of the spring. **(12 Marks)**

7 a. With usual notations derive an expression for gyroscopic couple. **(08 Marks)**

b. Each road wheel of a motor cycle has a mass moment of inertia 1.5kgm^2. The rotating parts of the engine have a mass moment of inertia of 0.25kgm^2. The speed of engine is five times the speed of wheels and is in same sense. The mass of the motor cycle with its rider is 250kg and its centre of gravity is 0.6m above the ground level. Find the angle of heel if the vehicle is travelling at 50km/hr and taking a turn of 30m radius, wheel dia is 0.6m. **(12 Marks)**

8 A cam with convex flanks operating a flat faced follower has a base circle diameter of 75mm and nose radius of 10mm. The lift of the follower is 19mm. The cam is symmetrical about a line drawn through the centre of nose and centre of cam shaft. The total angle of action is 120°. Determine maximum velocity, acceleration and retardation of the follower when the cam shaft rotates at 600rpm. **(20 Marks)**

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10ME55

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Manufacturing Process – III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain with neat sketches the classification of metal forming processes based on the force applied. **(10 Marks)**

b. Differentiate between Hot working and Cold working processes. **(05 Marks)**

c. Explain the concept of true stress and true strain. **(05 Marks)**

2 a. Explain the effect of various parameters a metal working process. **(10 Marks)**

b. Comment on: (i) Deformation zone geometry (ii) Residual stresses in wrought products. **(10 Marks)**

3 a. Derive an expression for forging pressure and load in open die forging by slab analysis in sliding friction at the interface. State the assumptions made. **(10 Marks)**

b. Determine the maximum and average die pressure for forging of a circular disc of 150 mm diameter and 100 mm thick between two flat dies having coefficient of friction 0.1. The yield strength of the disc material is equal to 230 N/mm^2. **(05 Marks)**

c. Explain the various forging defects. **(05 Marks)**

4 a. Explain with neat sketches different types of rolling mill arrangements. **(10 Marks)**

b. Briefly explain the phenomenon of the effect of back tension and front tension with respect to rolling load. **(05 Marks)**

c. Calculate the bite angle when rolling a plate of 15 mm thick using work rolls of 400 mm diameter and reducing the thickness by 3 mm. **(05 Marks)**

PART – B

5 a. With a neat sketch, explain the different elements of a drawing die. **(06 Marks)**

b. Starting from fundamentals derive an expression for drawing stress by slab analysis. **(08 Marks)**

c. Write a note on estimation of redundant work in drawing. **(06 Marks)**

6 a. With neat sketches, explain briefly direct and indirect extrusion processes. **(08 Marks)**

b. Explain clearly the variables influencing extrusion process. **(06 Marks)**

c. Briefly explain the different defects associated with extrusion. **(06 Marks)**

7 a. Explain the different types of sheet metal forming methods. **(08 Marks)**

b. Explain how circular washers are produced using a compand die. **(06 Marks)**

c. Explain forming limit diagram. **(06 Marks)**

8 a. Explain the principle of working with neat sketches: (i) Explosive forming (ii) Electrohydraulic forming. **(10 Marks)**

b. What is sintering? Explain its mechanism. **(05 Marks)**

c. List the applications of powder metallurgy components. **(05 Marks)**

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10ME56

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Turbomachines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define turbomachines. Briefly classify Turbo-machines. **(06 Marks)**

b. Define specific speed of pumps. Show that specific speed of pump is given by,

$$N_S = \frac{N\sqrt{Q}}{H^{\frac{3}{4}}}.$$ **(06 Marks)**

c. Tests on a turbine runner 1.25 m in diameter at 30 m head gave the following results, power developed = 736 kW, speed is 180 rpm and discharge 2.70 m^3/sec. Find the diameter speed and discharge of a runner to operate at 45 m head and give 1472 kW at the same efficiency. What is the specific speed of both the turbines? **(08 Marks)**

2 a. Show that for a finite number of stages for expansion the overall isentropic efficiency is given by,

$$\eta_e = \frac{1-\left[1-\eta_{st}\left\{1-\left(\frac{1}{P_r}\right)^{r-1}\right\}\right]^m}{\left\{1-\left(\frac{1}{P_r}\right)^{\frac{m(r-1)}{r}}\right\}}$$

where m = number of stages, P_r – Press ratio per stage, η_{st} = stage efficiency, r = ratio of specific heats. **(10 Marks)**

b. The output of a three stage gas turbine is 30 MW at the shaft coupling at an entry temperature of 1500 K. The overall pressure ratio across the turbine is 11.0 and efficiency 88%. If the pressure ratio of each stage is the same, determine (i) Pressure ratio of each stage (ii) Polytropic efficiency (iii) The mass flow rate, (iv) The efficiency and power of each stage. Assume $\gamma_{air} = 1.4$, $C_P = 1.005$ KJ/kgK, $\eta_{mech} = 91\%$. **(10 Marks)**

3 a. Why the discharge blade angles has considerable effect in the analysis of a turbomachine? Give reasons. **(04 Marks)**

b. Draw the velocity triangles at inlet and outlet of an axial flow turbine when (i) R is – ve . (ii) R = 0 (iii) R = 0.5 (iv) R = 01 (v) R>1. Discuss the energy transfer in each case. **(10 Marks)**

c. Liquid water flows at a rate of 31.5 kg/sec through a rotor of an axial flow turbine, where inlet and outlet mean diameters are 18.5 cm and 20 cm respectively. The other datas are: speed = 6000 rpm, V_1 = 35 m/sec and is directed axially, V_2 = 160 m/sec such that $\alpha_2 = 30^\circ$. Using mean inlet and outlet diameter find : (i) Torque exerted (ii) V_{r_1} and V_{r_2}. **(06 Marks)**

4 a. Define degree of reaction for an axial flow machine. Prove that degree of reaction for an axial flow device (assuming constant velocity of flow) is given by,

$$R = \frac{V_f}{2U}\left[\frac{\tan\beta_1 + \tan\beta_2}{\tan\beta_1 \times \tan\beta_2}\right].$$ **(10 Marks)**

b. At a stage of an impulse turbine, the mean rotor diameter is 80 cm, its rpm is 3000 rpm. The absolute velocity of fluid discharge from a nozzle inclined at 20° to plane of wheel is 300 m/sec. If utilization factor is 0.85 and relative velocity at rotor exit equals that at inlet, find the inlet and exit rotor angles. Also find power for $\dot{m}$ of 1 kg/sec. **(10 Marks)**

PART – B

5 a. Show that the maximum efficiency of a Parson's reaction turbine is,

$$\eta_{b_{max}} = \frac{2\cos^2\alpha_1}{1+\cos^2\alpha_1}.$$ **(10 Marks)**

b. Steam issues from a nozzle of a De-laval turbine with a velocity of 1200 m/sec. Nozzle angle is 20°. Blade speed is 400 m/sec. The inlet and outlet blade angles are equal. Mass flow rate is 900 kg/hr. Calculate : (i) Blade angles (ii) Relative velocities, if blade velocity co-efficient is 0.8. (iii) Tangential force on the blades (iv) Power developed (v) Blade efficiency. **(10 Marks)**

6 a. Draw the cross sectional view of a Kaplan turbine and explains its working. Also sketch the velocity triangles at inlet and outlet. **(10 Marks)**

b. A Pelton wheel produces 15,500 KW under a head of 350 m at 500 rpm. If overall efficiency of the wheel is 84%. Find:

(i) Required number of jets and diameter of each jet.
(ii) Number of buckets.
(iii) Tangential force exerted.

Assume : Jet ratio = 9.5, Q = 160°, ϕ = 0.46 **(10 Marks)**

7 a. What is cavitation? What are the causes for cavitation? Explain the steps to be taken to avoid cavitation. **(06 Marks)**

b. Draw the different types of casing and label the parts. **(06 Marks)**

c. The outer diameter of the impeller of a centrifugal pump is 40 cm and a width of the impeller at outlet is 5 cm. The pump is running at 800 rpm and working against a total head of 1.5 m. The Vane angle at outlet is 40° and manometric efficiency is 75%. Determine (i) Velocity of flow at outlet. (ii) Velocity of water leaving the vane (iii) Angle made by the absolute velocity at outlet with the direction of motion at outlet. **(08 Marks)**

8 a. With a neat schematic diagram, explain an axial flow compressor. Also sketch, the general velocity triangles for an axial flow compressor. **(10 Marks)**

b. Backward swept centrifugal fan develops a pressure of 75 mm WG. It has an impeller diameter of 89 cm and runs at 720 rpm. The blade angle at the tip is 39° and the width of the impeller is 10 cm. Assuming a constant velocity of flow of 9.15 m/s and density of 1.2 kg/m^3, determine the fan efficiency, discharge, power required, stage reaction and pressure coefficient. **(10 Marks)**

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