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10AL51

Fifth Semester B.E. Degree Examination, June/July 2017
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 with list and explain the functions of Management. **(10 Marks)**
b. "Manager plays a vital role in an organization". Justify this statement with reference to Interpersonal, Decision and Informational roles. **(10 Marks)**

2 a. State and explain importance of planning process. **(10 Marks)**
b. Elucidate on steps in Decision making with probable difficulties faced by Manager. **(10 Marks)**

3 a. What are Committees? Explain the principles of committees. **(10 Marks)**
b. Explain techniques of selection in detail. **(10 Marks)**

4 a. Define Motivation. Mention characteristics and anticipated results of motivation. **(10 Marks)**
b. Describe essentials of Sound control system. **(10 Marks)**

PART – B

5 a. Briefly describe Entrepreneurship and list out types of Entrepreneurs. **(10 Marks)**
b. Enumerate on barriers faced by Women Entrepreneurs. **(10 Marks)**

6 a. Describe Small Scale industry, Ancillary industry and Tiny industry. **(10 Marks)**
b. Explain the impact of Liberalization , Privatization and Globalization on small scale industry. **(10 Marks)**

7 a. Describe Single Window concept. **(05 Marks)**
b. Enumerate on functions of SISI. **(05 Marks)**
c. Explain the role of KSFC in setting up industries. **(05 Marks)**
d. Write on objectives of NSIC. **(05 Marks)**

8 a. Explain the process of product identification and project selection. **(10 Marks)**
b. Discuss on essentials of project appraisal. **(10 Marks)**

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10ME/AU52

Fifth Semester B.E. Degree Examination, June/July 2017
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. Identify the following materials from their designation and indicate the compositions:
(i) X10Cr18Ni9S3 steel (ii) SG 400/12 C.I. (iii) C35Mn75 steel. **(03 Marks)**

b. The state of stress in a planar member is as shown in Fig. Q1 (b). The maximum principal σ_1 stress in member is known to be 80 MPa. Determine (i) Shear stress τ_{xy} (ii) Max. shear stress τ_{max} and (iii) Minimum principal stress (σ_2). **(06 Marks)**

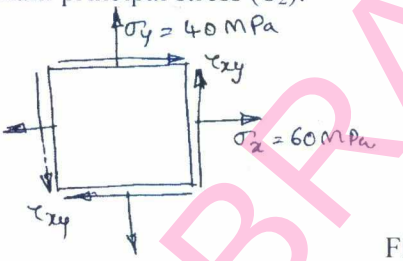

Fig. Q1 (b)

c. A bracket with rectangular cross section shown in Fig. Q1 (c) is subjected to a force of 5 kN, (P) acting at angle of 30° to the vertical. Determine the dimensions (t) of the bracket, taking the material as FG 200 cast iron and factor of safety 3.5, determine the dimensions of the cross section of bracket. **(11 Marks)**

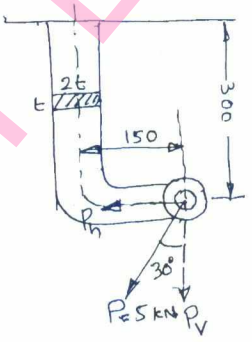

Fig. Q1 (c)

2 a. State 5 different theories of failure and explain any two. **(05 Marks)**

b. A bolt made of steel FeE_{200} is subjected to an axial load of 1500 N, and a shear force of 100 N, along with a twisting moment of 15 N-m as shown in Fig. Q2 (b). If the bolt diameter is 12 mm, what will be the factor of safety according to (i) maximum principal stress theory (ii) Maximum shear stress theory. Bolt length is 100 mm. **(09 Marks)**

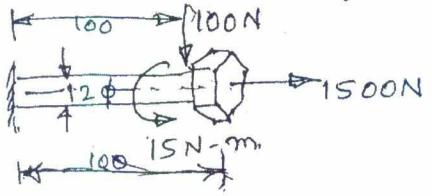

Fig. Q2 (b)

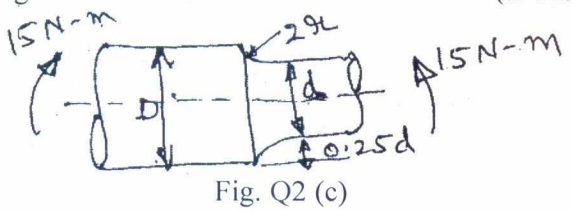

Fig. Q2 (c)

c. A round shaft made of ordinary Grey C.I. FG 200 is subjected to a bending moment of 15 N-m as shown in Fig. Q2 (c). The theoretical stress concentration factor at the fillet is 1.5. Determine the diameter 'd' and the maximum stress at the fillet. **(06 Marks)**

3 a. Derive the soderberg equation for members subjected to fluctuating stresses. **(06 Marks)**

b. A cantilever beam made of carbon steel of circular cross section shown in Fig. Q3 (b) is subjected to a load which varies from (-F) to (+3F). Determine the maximum load that this member can withstand for an infinite life using factor of safety '2'. Theoretical stress concentration factor of $K_t = 1.42$ and notch sensitivity of 0.9 may be used, with following stresses. (i) Ultimate strength $\sigma_u = 550$ MPa, Yield strength $\sigma_y = 470$ MPa. Assume endurance strength as 0.5 times ultimate strength (σ_u) and other correction factors for endurance strength suitably. **(14 Marks)**

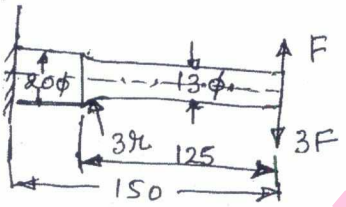

Fig. Q3 (b)

4 a. Explain what do you understand by bolts of uniform strength. **(06 Marks)**

b. A wall bracket is attached by means of 4 identical bolts, two at 'A' and two at 'B' and loaded as shown in Fig. Q4 (b). Assuming that the bracket is held against the wall firmly and prevented from tipping about the point C by all four bolts, determine the size of bolts taking an allowable tensile stress of 35 MPa and based on the maximum principal stress theory. **(14 Marks)**

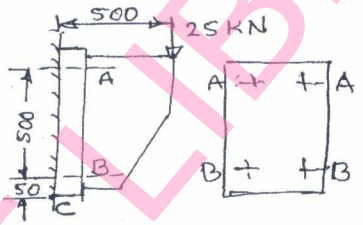

Fig. Q4 (b)

PART – B

5 A machine shaft running at 600 rev/min is supported on bearings 750 mm apart as shown in Fig. Q5. Fifteen KW is supplied to the shaft through a 450 mm. Pulley (P) located 250 mm to the right of the right bearing (R). The power is given away from the shaft through a 200 mm spur gear (G) located 250 mm to the right of the left bearing (L). The belt drive is at angle of 60° above the horizontal. The pulley weighs 800 N to provide some flywheel effect. The ratio of belt tensions is 3 : 1. The gear has a 20° tooth form and mates another gear located directly above it. The shaft material has an ultimate strength of 500 MPa and a yield strength of 310 MPa. Determine the necessary diameter of shaft as per ASME standards. Take the load factors in bending and torsion as 1.5 and 1.0 respectively and also keyway effects due to mounting of gear and pulley. The shaft rotates CCW looking from left as shown. **(20 Marks)**

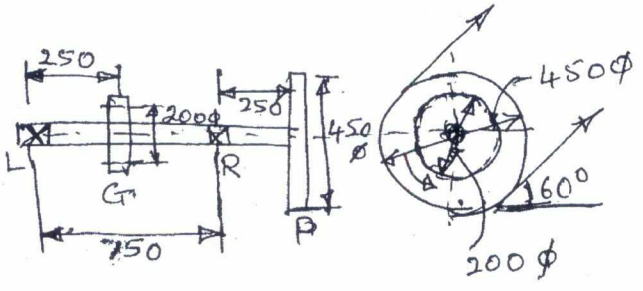

Fig. Q5

6 a. Design a knuckle joint to connect two circular rods subjected to an axial load of 50 KN. The rods are co-axial and a small angular movement between their axes is permissible. Assume the strength of the rods and pin same in tension and compression and equal to 400 MPa(σ_y) and shear strength is to be taken as 0.5 times yield strength. Factor of safety is 5. Also write a neat sketch of the assembly. **(08 Marks)**

b. It is required to design a protected type rigid flange coupling to connect two shafts. The shaft transmit 37.5 kW at 180 rev/min to the output shaft through the coupling. Starting torque is 1.5 times rated torque. The shafts and keys are made of steel with yield strength $\sigma_{yt} = 380$ N/mm^2 with a factor of safety 2.5. Flanges are made by C.I. FG 200 with a factor of safety 6. Assume ultimate shear strength as one half of the ultimate tensile strength. Also draw a sketch of the coupling. **(12 Marks)**

7 a. A welded connection as shown in Fig. Q7 (a) is subjected to an eccentric force of 7.5 kN. Determine the size of weld if the permissible shear stress for the weld is limited to 100 MPa. **(10 Marks)**

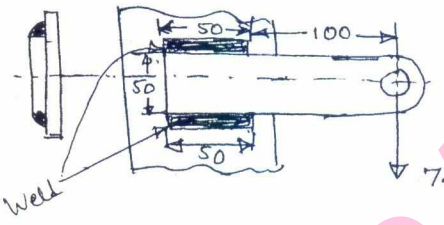

Fig. Q7 (a)

b. Design a double riveted double strap longitudinal butt joint, for a cylindrical steam pressure vessel of 1 m diameter subjected to an internal pressure of 2.5 MPa. The straps are of equal width. The pitch of the rivets in the outer row should be twice of the pitch of the rivets in the inner row. The rivets spacing has to be zig zag, between inner and outer rows, permissible tensile stress for the plates of vessel is 80 MPa and permissible shear stress for the rivets is 60 MPa. Assuming joint do not fail by crushing, determine the major dimensions and efficiency of the joint, which should be at least 70%. **(10 Marks)**

8 a. What is self locking screw? Show that efficiency of a square threaded self locking screw is less than $\frac{1}{2}$ or 50%. **(05 Marks)**

b. It is required to design a double start screw with square threads for the C-clamp shown in Fig. Q8 (b). The maximum force exerted by the clamp is 5 KN. It is assumed that, operator will exert a force of 250 N at the ball handle of the hand wheel. The screw has a nominal diameter of 22 mm, normal series square threads with 5 mm pitch and is made of 45C8 steel and the nut is made of FG200 cast iron. The mean diameter of collar friction is 12 mm and the bearing pressure between nut and screw may be assumed as 15 MPa. Check whether stress are safe and determine the radius of hand wheel. Assume a thread friction of 0.15 and collar friction as 0.17. **(15 Marks)**

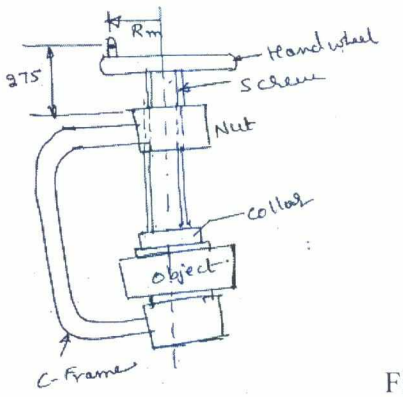

Fig. Q8 (b)

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10ME53

Fifth Semester B.E. Degree Examination, June/July 2017
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. Explain the principle of overfeed and underfeed strokers, with neat sketches. **(10 Marks)**
b. Explain a typical hydraulic ash handling system, with neat sketch. **(06 Marks)**
c. List the advantages and disadvantages of pulverized fuel. **(04 Marks)**

2 a. With a neat diagram, explain the working principle of Benson Boiler. **(08 Marks)**
b. Mention the various types of draught systems used at Chimneys and explain them with neat sketch. **(12 Marks)**

3 a. With the help of simple sketch, explain the working of Diesel Engine Power plant. **(10 Marks)**
b. Name the various starting methods used for diesel engines and explain them. **(10 Marks)**

4 a. Draw a typical layout of hydroelectric power plant and explain its working principle. **(08 Marks)**
b. What is a hydrograph? Write its uses. **(04 Marks)**
c. List the different types of surge tanks and explain them in brief. **(08 Marks)**

PART – B

5 a. Compare Fission and Fusion processes. **(04 Marks)**
b. With a neat sketch, explain working principle of Boiling Water Reactor (BWR) and mention its merits and demerits. **(10 Marks)**
c. Describe the Radioactive wastes disposal methods. **(06 Marks)**

6 a. Name Solar Radiation measuring instruments and explain any one with neat sketch. **(10 Marks)**
b. Wind blows with velocity of 16 m/s and at 15^0C. Assume 'One' standard atmospheric pressure. If the turbine diameter is 115m and operating at 40 RPM at maximum efficiency. Calculate axial thrust and torque at maximum efficiency. Assume propeller type wind turbine. **(10 Marks)**

7 a. With a neat diagram, explain the working principle of Rankine Cycle – OTEC power plant. **(10 Marks)**
b. Name the different Hydro Thermal convective system and explain any one system, with a neat sketch. **(10 Marks)**

8 a. Explain the difference between biomass and biogas. **(03 Marks)**
b. Describe the factors affecting biogas production. **(05 Marks)**
c. With a neat sketch, explain the construction and working of KVIC digester. **(12 Marks)**

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10ME/AU54

Fifth Semester B.E. Degree Examination, June/July 2017

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 slider crank mechanism has crank = 0.5m, connecting rod = 1.75m. When the crank is 60° away from IDC, a force of 1kN acts on slider, along line of stroke, away from crank centre. Find the torque T, needs to be applied on crank for static equilibrium of m/sm by

a. Virtual work method **(10 Marks)**

b. Drawing free body diagrams and applying equilibrium conditions. **(10 Marks)**

2 a. Explain in brief either "D'Alembert's principle" or "dynamically Equivalent system. **(06 Marks)**

b. Turning moment curve for one revolution of a multi cylinder engine above and below the line of mean resisting torque are given by −0.5, +1.2, −0.95, +1.45, −0.85, +0.71, −1.06 Sq. Cm. The vertical and horizontal scales are 1cm = 7000 N-m and 1cm = 30°. The engine speed is 800 rpm and it is desired that the fluctuation from minimum to maximum speed should not be more than 2% of average speed. Determine the moment of inertia of the flywheel. **(14 Marks)**

3 a. What are Pivot and Collar bearings? Explain in brief with sketches. **(06 Marks)**

b. An open belt connects two flat pulleys. The smaller pulley is 30cm in diameter and runs at 200rpm. The angle of lap on this pulley is 160° and the coefficient of friction between the belt and pulley face is 0.25. The belt is on the point of slipping when 2.61kW power is being transmitted. Which of the following alternative would be more effective in increasing the power transmitting capability?

i) Increasing the tension in the belt by 10%

ii) Increasing the coefficient of friction by 10% by the application of a suitable dressing to the belt. **(14 Marks)**

4 a. The weights W_1, W_2, W_3 and W_4 are 1962 N, 2943N, 2354N and 2550.6N respectively, in a plane perpendicular to shaft axis. The corresponding eccentricities are 20cm, 15cm, 25cm and 30cm respectively and the angles between the successive masses are 45°, 75° and 135°. Are these weights statically balanced? **(06 Marks)**

b. A shaft is supported in bearings 180cm apart and project 45cm beyond bearing at each end. The shaft carries three pulleys one at each end and one at the middle of its is length. The end pulleys weigh 471 N and 196.2N and their eccentricities are 1.5cm and 1.25cm respectively. The central pulley weighs 549.4N and its centre of gravity is 1.5cm from shaft axis. If the pulleys are arranged to give static balance, determine :

i) Relative angular positions of the pulleys and

ii) Dynamic forces at bearings when the shaft rotates at 300 rpm. **(14 Marks)**

PART – B

5 a. Explain Method of Direct and Reverse Crank'. **(06 Marks)**

b. The firing order in a 6 – cylinder vertical 4 – stroke in – line engine is 1-4-2-6-3-5. The stroke is 100mm and length of each connecting rod is 200mm. The pitch distances are 100mm, 100mm, 150mm, 100mm and 100mm respectively. The reciprocating mass per cylinder is 1kg and engine runs at 3000rpm. Determine maximum magnitudes of secondary unbalance force and couple, choosing a plane midway between the cylinders 3 and 4 as the reference plane. **(14 Marks)**

6 a. Explain in brief 'the effect of friction at sleeve on the performance of Porter Governor'. **(06 Marks)**

b. A spring loaded governor of the Hartnell type has arms of equal lengths. The weights rotate in a circle of 13cm diameter when the sleeve is in the mid-position and the weight arms are vertical. The equilibrium speed for this position is 450rpm, neglecting friction. The maximum sleeve movement is to be 2.5cm and the maximum variation of speed, taking friction into account is to be ± 5% of mid-position equilibrium speed. The weight of sleeve is 39N and the friction may be considered equivalent to 29N at the sleeve. The power of the governor must be sufficient to overcome the friction by a 1% change of speed either way at mid position. Determine, neglecting obliquity effect,

i) Weight of each rotating mass
ii) Spring stiffness in N/m
iii) Initial compression of spring **(14 Marks)**

7 a. Explain in brief:

i) Angular momentum
ii) Spin motion
iii) Processional motion. **(06 Marks)**

b. A rail Car has a total weight of 39240 N. there are two axles, each of which together with wheels has moment of inertia of 30 kg-m^2. The centre distance between the two wheels on an axle is 1.5m and each wheel is of 37.5cm radius. Each axle is driven by a motor and its speed is 3 times the speed of wheel. Each motor has a moment of inertia of 15 kg-m^2 and runs opposite to that of axle. The centre of gravity is 105cm above rails. Determine the limiting speed when it is negotiating a curve of 240m radius such that no wheel leaves the rail. **(14 Marks)**

8 a. Write a brief note on 'Undercutting in Cams'. **(06 Marks)**

b. A symmetrical Cam with convex flanks operates a flat footed follower. The lift is 8mm, base circle radius is 25mm and the nose radius is 12mm. If the total angle of cam action is 120°, find the radius of convex flanks. Also determine the maximum velocity and maximum acceleration when the cam shaft rotates at 500 rpm. **(14 Marks)**

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10ME55

Fifth Semester B.E. Degree Examination, June/July 2017
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. With neat sketches, explain the classification of metal working processes on the basis of force applied. **(10 Marks)**

b. With a neat sketch, explain true stress and true strain. **(05 Marks)**

c. Write a brief note on Wrought Products. **(05 Marks)**

2 a. Briefly explain the effect of Temperature, Friction and Lubrication in metal working process. **(10 Marks)**

b. With a neat sketch, explain the hydrostatic pressure in metal working. **(10 Marks)**

3 a. Derive the expression for forging pressure and load in open die forging by slab analysis making suitable assumptions. **(10 Marks)**

b. Explain die design parameters in forging. **(05 Marks)**

c. Explain typical defects in forged components. **(05 Marks)**

4 a. With a neat sketch, explain planetary rolling mill. **(05 Marks)**

b. Describe the effect of front and back tension on the rolling load. **(05 Marks)**

c. Calculate the rolling load if a steel is hot rolled from a 40mm thick slab of width 760mm. The reduction in thickness achieved is 30% and the roll diameter is 900mm. The plane strain flow stress is 140 MPa at the entrance and 200 MPa at the exit from the roll gap because of the increasing velocity. Assume the co-efficient of friction as 0.3. If the roll speed is 100 rpm, what is power required to drive the rolls? **(10 Marks)**

PART – B

5 a. Explain Optimal cone angle and Dead zone formation in drawing. **(06 Marks)**

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

c. A steel wire is drawn from an initial diameter of 12.5mm to a final diameter of 10mm at the speed of 120m/min. The half cone angle of the die is 6^0 and the coefficient of friction at the die – wire interfaces is 0.12. A tensile test on the steel specimen has shown a yield stress of 210N/mm^2. Determine the draw force and the power required, assuming that there is no back tension applied. **(08 Marks)**

6 a. Give the classification of extrusion processes and explain forward extrusion process with a neat sketch. **(08 Marks)**

b. Write a note on extrusion equipment and die design. **(04 Marks)**

c. Explain the manufacture of seamless tubes, with neat sketch. **(08 Marks)**

7 a. Explain the various operations performed on sheet metal component. **(10 Marks)**

b. With neat sketch, explain the following dies : i) Progressive dies ii) Compound dies. **(10 Marks)**

8 a. With a flow chart, explain the operations involved in making powder metallurgy parts. **(10 Marks)**

b. Explain the principles of High energy rate forming. **(04 Marks)**

c. With a neat sketch, explain the explosive forming process. **(06 Marks)**

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10ME56

Fifth Semester B.E. Degree Examination, June/July 2017

Turbo Machines

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Missing data may be assumed suitably.***

PART – A

1 a. List the difference between positive displacement machines and turbo machines. **(05 Marks)**

b. Explain the significance of flow coefficient, head coefficient and power coefficient with equations. **(05 Marks)**

c. An output of 10 KW was recorded on a turbine of 0.5 m dia running at a speed of 800 rpm under a head of 20 m. What is the diameter and output of another turbine which works under a head of 180 m, at a speed of 200 rpm when their efficiencies are same? Find the specific speed and name the turbine which you preferred. **(10 Marks)**

2 a. Define static and stagnation states. **(05 Marks)**

b. Define total-to-total efficiency and static to static efficiency of compression process. **(05 Marks)**

c. Air enters a compressor at a static pressure of 1.5 bar, a static temperature of 15°C and a flow velocity of 50 m/s. At the exit the static pressure is 3 bar, the static temperature is 100°C and the flow velocity is 100 m/s. The outlet is 1 m above the inlet. Evaluate:
i) The isentropic change in enthalpy
ii) The actual change in enthalpy
iii) Efficiency of compressor. **(10 Marks)**

3 a. With a neat sketch derive an expression for Euler's turbine equation. **(10 Marks)**

b. An inward flow reaction turbine has outer and inner diameter of the wheel as 1 m and 0.5 m respectively. The vanes are radial at inlet, and the discharge is radial at outlet and water enters the blade at an angle of 10°. Assume the velocity of flow is constant and equal to 3 m/s, find:
i) Speed of the wheel
ii) Outlet blade angle
iii) Degree of reaction R. **(10 Marks)**

4 a. Derive an expression for degree of reaction for radial outward flow machine and explain briefly the effect of β_2, blade discharge angle on degree of reaction 'R'. **(10 Marks)**

b. For a radial outward flow turbo machine has no inlet whirl. The blade speed at the exit is twice that of inlet. Assume radial velocity is constant, with inlet blade angle = 45°. Show that degree of reaction,

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

where β_2, blade angle at exit with respect to tangential direction. **(10 Marks)**

PART – B

5 a. Derive the condition for maximum utilization factor for impulse turbine. **(10 Marks)**

b. The following data refers to Delaval turbine. Velocity of steam at exit of the nozzle is 1000 m/s with a nozzle angle of 20°. The blade velocity is 400 m/s and the blades are equiangular. Assume a mass flow rate of 1000 kg/hr, friction coefficient 0.8 nozzle efficiency 0.95, calculate:

i) Blade angles
ii) Work done/kg of steam
iii) Power developed
iv) Blade efficiency
v) Stage efficiency. **(10 Marks)**

6 a. Define the draft tubes with a neat sketch. Explain different type of draft tubes. **(05 Marks)**

b. Define mechanism efficiency and overall efficiency of turbines. **(05 Marks)**

c. A propeller turbine has a outer diameter of 4.5 m and inner diameter 2m. It develops 20,605 KW under a head of 20 m at 137 rpm, the hydraulic efficiency is 0.94 overall efficiency is 0.88. Find the:

i) Runner blade angles
ii) Discharge through the runner. **(10 Marks)**

7 a. Explain with a neat sketch, multistage centrifugal pump arrangement. **(05 Marks)**

b. Explain with a neat sketch, different casings of pump. **(05 Marks)**

c. A three stage centrifugal pump has impeller 40 cm dia and 2 cm width at outlet. The vanes are curved back at an angle of 45° at the outlet and reduced the circumferential area by 10%. The manometric efficiency is 90% and overall efficiency is 0.8. Find the total head generated by the pump, when running at 1000 rpm, delivering 50 lit/sec. also calculate the power required to drive the pump. **(10 Marks)**

8 a. Explain slip and slip coefficient. **(05 Marks)**

b. Explain surging and choking of compressor. **(05 Marks)**

c. An axial flow compressor of 50% reaction design has blades with inlet and outlet angles with respect to axial directions of 45° and 10° respectively. The compressor is to produce a pressure ratio of 6:1 with a overall isentropic efficiency of 0.85. When the inlet static temperature is 37°C. The blade speed and axial velocity are constant throughout the compressor. Assuming a value of 200 m/s for blade speed. Find the number of stages required if the work done factor is (i) unity, (ii) 0.87 for all the stages. **(10 Marks)**

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