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10AL51

Fifth Semester B.E. Degree Examination, June/July 2018
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Explain the term management and discuss the functions of management. **(08 Marks)**
b. Explain modern management approaches. **(12 Marks)**

2 a. Explain the steps involved in planning process with an example. **(08 Marks)**
b. Explain the hierarchy of plans of a organization. **(12 Marks)**

3 a. Explain with a block diagram line and matrix type of organization. **(08 Marks)**
b. Explain the principles of organization. **(12 Marks)**

4 a. Explain the requirements of effective direction. **(06 Marks)**
b. Explain Maslaw's hierarchy of needs theory. **(08 Marks)**
c. Differentiate between co-ordination and cooperation. **(06 Marks)**

PART – B

5 a. Explain the concept of entrepreneurship and its evolution. **(08 Marks)**
b. Explain the types of entrepreneur. **(12 Marks)**

6 a. Explain the characteristics of small enterprises. **(08 Marks)**
b. Explain the advantages of small enterprises. **(12 Marks)**

7 a. Explain the activities of Karnataka Industrial Area Development Board (KIADB). **(10 Marks)**
b. Explain the activities of Karnataka State Small Industries Development Corporation (KSSIDC). **(10 Marks)**

8 Explain various details which should be included in a project work. **(20 Marks)**

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10ME52

Fifth Semester B.E. Degree Examination, June/July 2018

Design of Machine Elements – I

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of design data hand book is permitted.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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PART – A

1 a. What are the basic requirements of machine elements? Explain briefly. **(04 Marks)**

b. The state of stress at a point in a strained member is shown in Fig.Q1(b). The tensile principal stress is known to be 84 N/mm^2. Determine:
i) Maximum shearing stress at the point and orientation of its plane
ii) Shearing stress τ_{xy}.

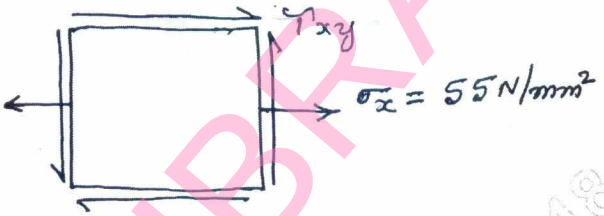

Fig.Q1(b) **(08 Marks)**

c. A bar of 50 mm diameter fixed at one end is subjected to a torsional load of 1 kN-m in addition to an axial pull of 15 kN. Determine the principal stresses if the length of the shaft is 250 mm. **(08 Marks)**

2 a. Explain the following theories of failure and state when they are used:
i) Maximum principal stress theory.
ii) Maximum shear stress theory. **(05 Marks)**

b. Determine the maximum stress induced in the semi circular grooved shaft in Fig.Q2(b) if it is subjected to :
i) An axial load of 40 kN
ii) A bending moment of 400 Nm
iii) A twisting moment of 500 Nm.

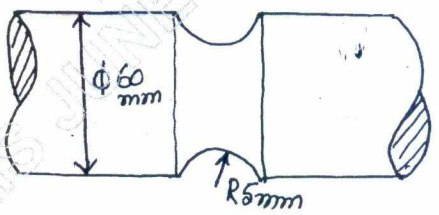

Fig.Q2(b) **(10 Marks)**

c. Derive an expression for stress induced in a rod due to the axial impact of a weight 'W' dropped from a height 'h' on to a collar attached at the free end of the rod. What is the stress due to suddenly applied load? **(05 Marks)**

3 a. Derive Goodman's relation. **(05 Marks)**

b. A steel cantilever member shown in Fig.Q3(b) is subjected to a transverse load at its end that varies from 45 N up to 135 N down as an axial load varies from 110 N compression to 450 N tension. Determine the required diameter at the change of section for infinite life using a factor of safety of 2. The strength properties of the material are σ_u = 550 MPa, σ_y = 470 MPa and σ_{-1} = 275 MPa. Notch sensitivity index q = 1.

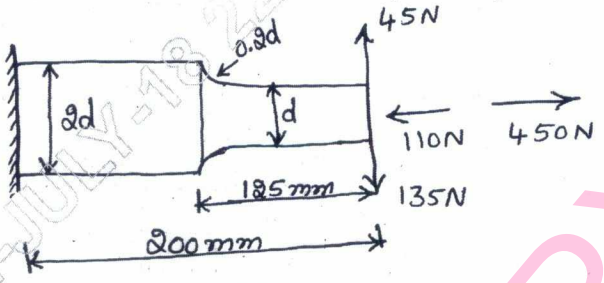

Fig.Q3(b) **(15 Marks)**

4 a. A flat circular plate is used to close the flanged end of a pressure vessel of internal diameter 300 mm. The vessel carries a fluid at a pressure of 0.7 N/mm^2. A safe copper gasket is used to make the joint leak proof. Twelve bolts are used to fasten the cover plate on to the pressure vessel. Find the size of bolts so that the stress in the bolts is not to exceed 100 N/mm^2. **(08 Marks)**

b. The structural connection shown in Fig.Q4(b) is subjected to an eccentric load P of 10 kN with an eccentricity of 500 mm. The centre distance between bolts at 1 and 3 is 150 mm and the centre distance between bolts at 1 and 2 is 200 mm. All bolts are identical. The bolts are made of plain carbon steel having yield strength in tension of 400 MPa and the factor of safety is 2.5. Determine size of bolts.

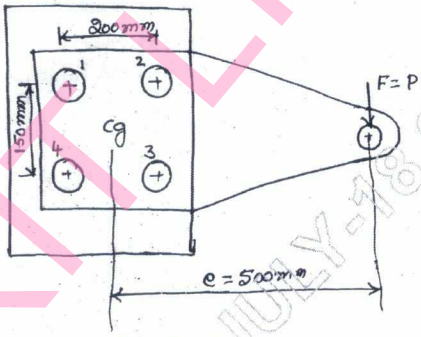

Fig.Q4(b) **(12 Marks)**

PART – B

5 A transmission shaft running at 500 rev/min is supported on bearings 800 mm apart. 20 KW power is supplied to the shaft through a 450 mm diameter pulley which is located 400 mm to the right of right bearing and receives power from a motor placed directly below the shaft. The shaft further transmits this power to a spur gear of 300 mm pitch circle diameter, which is located at 400 mm to the right of left bearing. The gear has 20° involute teeth and ratio of belt tensions is 3:1. The gear drives another gear which is placed directly above the shaft. The gear and pulley are keyed to the shaft. Selecting the material as steel having σ_{ut} = 700 MPa and σ_{yt} = 460 MPa as per ASME code, determine the diameter of shaft. Assume shock factors for bending and torsion as 1.5. **(20 Marks)**

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6 a. A rectangular sunk key 14 mm wide × 10 mm thick × 75 mm long is required to transmit 1200 Nm torque from a 50 mm diameter solid shaft. Determine whether the length is sufficient or not if the permissible shear stress and crushing stress are limited to 56 MPa and 168 MPa respectively. **(06 Marks)**

b. Design a flange coupling to connect the shafts of a motor and centrifugal pump for the following specifications Pump output = 3000 litres/minute; total head = 20 m; pump speed = 600 rpm; pump efficiency = 70%. Select C40 steel (σ_y = 328.6 MPa) for shaft and C35 steel (σ_y = 304 MPa) for bolts with factor of safety 2. Use allowable shear stress in cast iron flanges equal to 15 N/mm^2. **(14 Marks)**

7 a. Design a double riveted butt joint with two cover plates for the longitudinal Seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.9 MPa. Assume joint efficiency as 75%. Allowable stress in tension for the plate is 83 MPa in compression 138 MPa and shear stress in rivets may be assumed as 55 MPa. Assume chain riveted joint. **(10 Marks)**

b. Determine the size of weld required for the joint shown in Fig.Q7(b), if the allowable shear stress in the weld is limited to 80 N/mm^2.

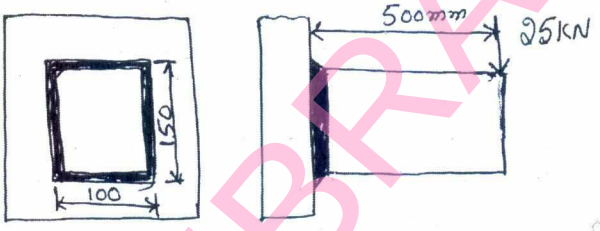

Fig.Q7(b) **(10 Marks)**

8 a. Explain self locking and over hauling in power screws. **(04 Marks)**

b. A screw jack is to lift a load of 80 kN through a height of 400 mm. Ultimate strength of screw material in tension and compression is 200 N/mm^2 and in shear 120 N/mm^2. The material for the nut is phosphor bronze for which the ultimate strength is 100 N/mm^2 in tension and 90 N/mm^2 in compression and 80 N/mm^2 in shear. The bearing pressure between the nut and the screw is not to exceed 18 N/mm^2. Design the screw and nut and check for the stresses. Take FOS = 2. Assume 25% overhead for screw rod design. **(16 Marks)**

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10ME53

Fifth Semester B.E. Degree Examination, June/July 2018
Energy Engineering

Time: 3 hrs. Max. Marks: 100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART - A

1 a. With a neat sketch, explain the unit system of Pulverized fuel burning. **(06 Marks)**
b. Explain Pulverized fuel burners, with sketches. **(08 Marks)**
c. Explain pneumatic ash handling system, with neat diagram. **(06 Marks)**

2 a. Give comparison between Forced and Induced draughts. **(06 Marks)**
b. Explain Benson boiler with a neat diagram and state their advantages. **(08 Marks)**
c. What is the purpose of super heater? What are the factors responsible for super heater fouling? **(06 Marks)**

3 a. What are the different fields where use of diesel power plant is essential? **(06 Marks)**
b. With the help of neat diagram, explain the working principle of forced cooling system. **(08 Marks)**
c. Name the different types of fuel injection system. Explain any one with a neat sketch. **(06 Marks)**

4 a. Explain Storage, Pondage and Pumped storage hydro electric plants. **(06 Marks)**
b. The mean monthly discharge at a hydel power plant site is given below: The discharge is in m^3/sec. Draw i) Hydrograph and ii) Flow duration curve. **(08 Marks)**

Month	1	2	3	4	5	6	7	8	9	10	11	12
Discharge	100	225	300	600	750	800	1000	1200	900	600	400	200

c. Write a note on Surge tank. **(06 Marks)**

PART - B

5 a. Give the functions of : i) Reflector ii) Control rods iii) Moderator. **(06 Marks)**
b. Explain Sodium graphite reactor, with neat sketch. **(08 Marks)**
c. List the Nuclear Power Plants in INDIA, with its centre of location and their capacity of power generation. **(06 Marks)**

6 a. Explain Pyrheliometer, with a sketch. **(06 Marks)**
b. Sketch and explain a Solar pond. **(08 Marks)**
c. Explain the working principle of vertical axis wind mill, with neat diagram. **(06 Marks)**

7 a. What are the limitations of Tidal energy? **(06 Marks)**
b. Explain Open cycle OTEC, with neat sketch. **(08 Marks)**
c. What are the Environmental Problems Associated, with Geothermal conversion? **(06 Marks)**

8 a. Mention the advantages and disadvantages of bio – mass energy. **(06 Marks)**
b. What is an Aerobic Fermentation? Explain the stages of bio – gas production from organic waste by an Aerobic fermentation. **(08 Marks)**
c. Write a note on Thermo chemical method to extract energy from bio – mass. **(06 Marks)**

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10ME54

Fifth Semester B.E. Degree Examination, June/July 2018
Dynamics of Machines

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – A

1 a. What are the conditions for a body to be in equilibrium under the action of (i) two forces (ii) three forces (iii) two forces and a torque? **(06 Marks)**

b. A four bar mechanism shown in Fig.Q1(b) is acted by a force F = 2000 N. Calculate the required torque on link AB(T_2) for equilibrium of the mechanism. Given AB = 200mm, BC = 370 mm, DC = 250 mm, AD = 215 mm, CE = 100 mm, ∠DAB = 110°, ∠CEF = 45°. **(14 Marks)**

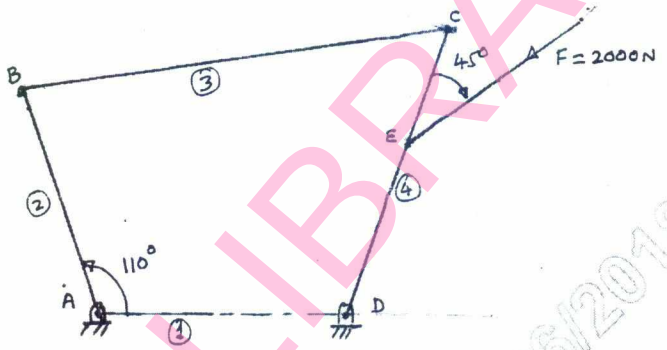

Fig.Q1(b)

2 a. Derive an expression for the size of flywheel. **(06 Marks)**

b. During one revolution of the crank of a multicylinder engines the areas above and below the mean turning moment line taken in order are +0.36, – 0.81, +0.75, – 0.64, +0.92, – 0.58 cm^2. Horizontal scale of diagram 1 cm = 45°, vertical scale 1 cm = 7200 Nm, speed of engine 150 rpm, total fluctuation of speed 2% of mean speed. Find
(i) Mass of flywheel (ii) Area of cross section of rim.
Neglect the effect of arms and boss. Take density of rim material as 7260 kg/m^3 and peripheral speed (mean) as 1000 m/min. **(14 Marks)**

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

b. A leather belt drive is required to transmit 10 kW from a motor running at 600 RPM. The belt is 12mm thick and has mass density of 0.001 gm/mm^3. Safe stress in the belt not to exceed 2.5 N/mm^2. Diameter of driving pulley is 250 mm whereas speed of the driven pulley is 220 RPM. Two shafts are 1.25 m apart. The coefficient of friction is 0.25. Determine the width of the belt. **(14 Marks)**

4 a. Explain the procedure for balancing several masses rotating in the same plane. **(06 Marks)**

b. A shaft carries four masses A, B, C and D of magnitude 200 kgs, 300 kgs, 400 kgs, and 200 kgs respectively revolving at radii 80 mm, 70 mm, 60 mm and 80 mm respectively. The distances of the planes in which masses B, C, D are revolving as measures from the plane of rotation of mass A is 300 mm, 400 mm and 700 mm. The angles between the cranks measured counter clockwise are A to B 5°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between planes A and X is 100 mm and that between planes X and Y is 400 mm. The distance between planes Y and D is 200 mm. If the balancing masses revolve at radius of 100 mm, determine their magnitude and angular positions. **(14 Marks)**

PART – B

5 a. Show that for a 90° engine the primary forces can be balanced by a single rotating balance mass. **(06 Marks)**

b. A four cylinder vertical engine has cranks 300 mm long. The planes of rotation of first, third and fourth cranks are 750mm, 1050mm and 1650 mm respectively from that of the second crank and their reciprocating masses are 150 kg, 400 kg and 250 kg respectively. Find the mass of reciprocating parts for the second cylinder and the relative angular position of the cranks in order that the engine may be in complete primary balance. **(14 Marks)**

6 a. Each arm of a porter governor is 300 mm long and pivoted on the axis of rotation. Each ball has a mass of 6 kg and the mass of the sleeve is 18 kg. Radius of rotation of the ball is 200mm when the governor begins to lift and 250 mm when the speed is maximum. Determine the maximum and minimum speed of the governor. **(10 Marks)**

b. In a spring loaded governor of Harmell type rotating masses are each 1.5 kg and rotate at a radius of 120 mm when the equilibrium speed is 550 RPM. At this speed the arms of bell crank lever are 100 mm and 75 mm respectively are vertical and horizontal when the equilibrium speed is 575 RPM, the rotating masses are at maximum radius of 145 mm. Determine the rate of spring and compression of spring at 550 RPM. **(10 Marks)**

7 a. Describe the effect of gyroscopic couple on an aeroplane. **(06 Marks)**

b. A ship is propelled by a turbine rotor of mass 500 kg and has a speed of 2400 RPM. The rotor has a radius of gyration of 0.5 m and rotates in clockwise direction when viewed from stern. Find the gyroscopic effect when

(i) The ship pitches ± 5° from the horizontal position with a time period of 20 sec with SHM. Bow descending with max velocity.

(ii) Ship runs at speed of 15 knots (1 knot = 1.860 km/hr) and steers to the left in a curve of 60 m radius.

(iii) Ship rolls with angular velocity of 0.04 rad/sec clockwise when viewed from the stern. **(14 Marks)**

8 A symmetrical cam with convex flanks operating a flat faced follower has a base circle diameter of 75 mm and nose radius of 10 mm. The lift the follower is 20 mm. The cam is symmetrical and the total angle of action is 120°. Determine (i) Principal dimensions of the cam (ii) Acceleration of the follower at the beginning of lift, at the end of contact with circular flank, at the beginning of contact with the nose and at the apex of the nose. Speed of cam shaft is 600 RPM. **(20 Marks)**

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10ME55

Fifth Semester B.E. Degree Examination, June/July 2018
Manufacturing Process – III

Time: 3 hrs. Max. Marks:100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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PART – A

1 a. Explain Tresca yield criterion and Von Mises yield criterion with relevant to mathematical expression in terms of Principal stresses. **(10 Marks)**

b. Explain the advantages of wrought product over cast and machined products. **(05 Marks)**

c. Classify and explain the metal forming processes. **(05 Marks)**

2 a. Explain briefly the variables which influence the metal working processes. **(15 Marks)**

b. Explain residual stresses in wrought products. **(05 Marks)**

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

b. Explain typical forging defects. **(05 Marks)**

c. List and explain die design parameters. **(05 Marks)**

4 a. Classify and explain the different types of rolling mills. **(10 Marks)**

b. Calculate the rolling load if a steel sheet is hot rolled 40% from a 400 mm thick slab using 900 mm dia. rolls. The slab is 760 mm wide. Assume $\mu = 0.3$, the plane strain flow stress is 140 MPa at the entrance and 200 MPa at the exist from the roll gap due to increasing velocity. What would be the rolling load, if sticking friction occurs. **(10 Marks)**

PART – B

5 a. Explain with sketch any two methods of tube drawing. **(10 Marks)**

b. Write a note on optimal cone angle and dead zone formation. **(05 Marks)**

c. Determine the power required to draw hut steel wire from 12.5 mm to 10 mm in dia. at 100 m/min. The μ is 0.1 and the die angle is 8°. Average flow stress is 300 MPa. Also determine the maximum possible reduction. **(05 Marks)**

6 a. Explain with sketch impact extrusion. What are its applications? **(09 Marks)**

b. With a neat sketch explain lateral or side extrusion process. **(06 Marks)**

c. Explain any six defects in extruded products with reason. **(05 Marks)**

7 a. What are the differences between a compound die and progressive die? Explain with sketches. **(10 Marks)**

b. Explain with sketch the following operations in sheet metal forming: (i) Deep drawing (ii) Stretch forming (iii) Rubber press forming. **(10 Marks)**

8 a. Explain the different steps involved in powder metallurgy process. **(08 Marks)**

b. Explain with a neat sketches : (i) Explosive forming (ii) Electromagnetic forming (iii) Electro hydraulic forming. **(12 Marks)**

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10ME56

Fifth Semester B.E. Degree Examination, June/July 2018
Turbo Machines

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting at least TWO full questions from each part.*
2. Use of steam tables and thermodynamic data handbook is permitted.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Define a turbomachine. Explain with neat sketch construction and working of a turbomachine. **(06 Marks)**

b. Enumerate the difference between a turbomachine and a positive displacement machine. **(06 Marks)**

c. A wind mill model of 1:10 scale develops 2 kW under a head of 6m at 500rpm. A prototype work under a head of 40m. Assuming that the efficiencies of model and prototype remains same. Determine the power developed, speed of the prototype and its specific speed. **(08 Marks)**

2 a. Define the following with the help of h-s diagram for the power generating turbomachines:
i) total-to-total efficiency ii) total-to static efficiency. **(04 Marks)**

b. Derive an expression for an overall isentropic efficiency for a finite number of stages of compression interms of pressure ratio, stage efficiency, number of stages and ratio of specific heats for a compressor. **(08 Marks)**

c. A 16 stage axial flow compressor is to have a pressure ratio of 6.3 with a stage efficiency of 89.5%. The intake conditions are 15°C and 1 bar. Determine:
i) Expected overall efficiency
ii) The polytropic efficiency

Take $\gamma = \frac{C_p}{C_v} = 1.4$. **(08 Marks)**

3 a. Define utilization factor and degree of reaction of a turbine. Derive an expression for establishing relation between utilization factor and degree of reaction. **(10 Marks)**

b. An impulse turbine having mean blade diameter 0.75m runs with a speed of 2800 rpm. The absolute velocity of jet leaving a nozzle inclined at 18° to the plane of wheel is 280 m/s. If the utilization factor is 0.88 and relative velocity at the rotor exit and at the inlet remains same. Determine:
i) The inlet and outlet blade angles
ii) Work done
iii) Power output for a mass flow rate of 10 kg/s. **(10 Marks)**

4 a. Explain why turbine with reaction R > 1 and R < 0 are not in practical use? **(04 Marks)**

b. In an inward flow radial hydraulic turbine for maximum utilization factor show that,

$\alpha_1 = \cot^{-1}\sqrt{\left(\frac{(1-R)}{1-\epsilon}\right)\epsilon}$ where α_1 = Nozzle angle, R = Degree of reaction, ϵ = utilization factor. Assume radial velocity component is constant throughout and there is no tangential component of absolute velocity at outlet. **(08 Marks)**

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c. Air enters in an axial flow turbine with a tangential component of absolute velocity equal to 600 m/s in the direction of rotation. At the rotor exit, the tangential component of absolute velocity is 100m/s in a direction opposite to that of rotational speed. The tangential blade speed is 250m/s. Find:
   i) Change in total enthalpy of air between the inlet and outlet of the rotor.
   ii) The power developed if the mass flow rate is 10kg/s
   iii) The change in total temperature across the rotor. **(08 Marks)**

PART – B

5 a. What are the differences between impulse and reaction steam turbine. **(06 Marks)**

b. Explain with the help of a neat sketch how an impulse steam turbine is compounded for velocity. **(06 Marks)**

c. In a stage of an impulse turbine provided with single row wheel, the mean diameter of blade is 1m rotates at 3000rpm. Steam issues from a nozzle at a velocity of 350 m/s and nozzle angle 20°. The rotor blades are equiangular, blade friction is 0.86. Determine the power developed if the axial thrust acting on the rotor bearing is 120N. **(08 Marks)**

6 a. Derive an expression for maximum hydraulic efficiency of a Pelton wheel interms of runner tip angle and bucket velocity coefficient. **(10 Marks)**

b. A Pelton wheel develops 23.11 MW under a head of 1770m while running at 750rpm. Find: i) Jet diameter ii) Mean diameter of the runner iii) Number of buckets.
Assume: $C_v = 0.97$, $\phi = 0.46$, $\eta_T = 0.85$. **(10 Marks)**

7 a. Explain the following with reference to centrifugal pumps:
   i) Manometric efficiency with expression.
   ii) Cavitation in pumps
   iii) Net positive suction head
   iv) Need for priming
   v) Pumps in series. **(10 Marks)**

b. A centrifugal pump delivers 50 litres against a total head of 24m when running at 1500rpm. The velocity of flow is maintained constant at 2.4 m/s and blades are curved back at 30° to the tangent at outlet. The inner diameter is half the outer diameter. If the manometric efficiency is 80%, determine:
   i) Blade angle at inlet
   ii) Power required to drive the pump. **(10 Marks)**

8 a. What is the function of a diffuser? Name the different types of diffusers and explain them with neat sketch. **(10 Marks)**

b. A centrifugal compressor delivers 20kg/s of air with a total head pressure ratio of 4:1. The speed of the compressor is 12,000rpm. Inlet total temperature is 15°C stagnation pressure at inlet is 1.0 bar, slip factor is 0.9, power input factor is 1.04. Efficiency is 80%. Calculate the outer diameter of the impeller. **(10 Marks)**

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