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10AL51

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
## 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 and explain the functions of Management. **(10 Marks)**
b. Explain the scope of management. Explain the characteristics and levels of management. **(10 Marks)**

2 a. Explain Hierarchy of plans. **(05 Marks)**
b. Briefly explain types of planning. **(05 Marks)**
c. State the different types of decisions and explain the steps in decision - making. **(10 Marks)**

3 a. Explain with sketch the line and staff organisation. **(05 Marks)**
b. What are the advantages of Management By Objectives (MBO) and Advantages of Management by Exception (MBE)? **(10 Marks)**
c. What are the advantages of Matrix Organisation? **(05 Marks)**

4 a. Write about Maslow's theory of Motivation. **(05 Marks)**
b. Explain Mc Gregor's theory X and theory Y. **(05 Marks)**
c. Differentiate between Co-ordination and Co-operation. **(05 Marks)**
d. What are barriers of successful communication? **(05 Marks)**

### PART – B

5 a. Briefly compare Intrapreneurs, Entrepreneurs and managers. **(06 Marks)**
b. Explain in detail the stages in Entrepreneurial process. **(10 Marks)**
c. Explain the characteristics of Entrepreneurship. **(04 Marks)**

6 a. Define briefly about Ancillary Industry and Tiny Industry. **(06 Marks)**
b. Write a short note on GATT and also mention the challenges faced since its inception. **(10 Marks)**
c. List four prominent functions of WTO. **(04 Marks)**

7 a. Name any five state or Central Government Institutions and state their objectives and functions. **(10 Marks)**
b. Explain the roles of IDBI. **(05 Marks)**
c. Write a note on Single window DIC agency. **(05 Marks)**

8 a. Write short notes on : i) Quantifiable and non – quantifiable projects ii) Sectoral projects. **(05 Marks)**
b. Classify Techno – Economic projects and briefly describe the same. **(06 Marks)**
c. Write short notes on :
i) Project Identification ii) Project Selection iii) Project Report. **(09 Marks)**

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10ME52

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.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 handbook is permitted.***
**3.** ***Missing data may suitably be assumed.***





### PART – A

1 a. Briefly explain important mechanical properties of materials. **(06 Marks)**

b. A round rod of 60 mm diameter is subjected to bending moment of 900 Nm and a twisting moment of 1200 Nm. Determine the maximum normal and shear stresses induced in the rod. **(08 Marks)**

c. A 1 mm thick steel hacksaw blade is bent into circular arc of radius 500 mm. Determine the bending moment applied and the stress induced. The width of blade is 15 mm. Modulus of elasticity is 200 GPa. **(06 Marks)**

2 a. A steel shaft having yield strength of 328.6 MPa is subjected to the following stresses. $\sigma_x$ = 90 MPa, $\sigma_y$ = 60 MPa and $\tau_{xy}$ = 30 MPa. Find the factor of safety according to the following theories of failure: (i) Rankine's theory, (ii) Guest's theory. **(06 Marks)**

b. A stepped shaft with diameters ratio as 1.2 and a fillet radius of 10% of smaller diameter is required to transmit 30 kW at 600 rpm. Find the diameter of the shaft taking stress concentration into account. The allowable shear stress is 60 MPa. **(06 Marks)**

c. Describe expression for maximum stress induced in axial impact. **(08 Marks)**

3 a. Derive Soderberg's relation for ductile materials. **(06 Marks)**

b. A cantilever beam of rectangular cross section having a span of 1200 mm and depth of 200 mm is subjected to a transverse load at its end that fluctuates between 60 kN upward to 120 kN downward. It is made of steel having endurance stress of 270 MPa, ultimate stress of 550 MPa and yield stress of 400 MPa. Find the width of the section taking factor of safety as 2.5. The size and surface factors are 0.9 and 0.95 respectively. **(14 Marks)**

4 a. A bolt is subjected to a tensile load of 12 kN and a tightening load of 3 kN. It is made of steel having allowable tensile stress of 120 MPa. A soft copper gasket is used. Find the size of the bolt. **(06 Marks)**

b. A bracket is bolted as shown in Fig.Q4(b). All the bolts are identical and have allowable stress of 60 MPa. Determine the size of the bolt.

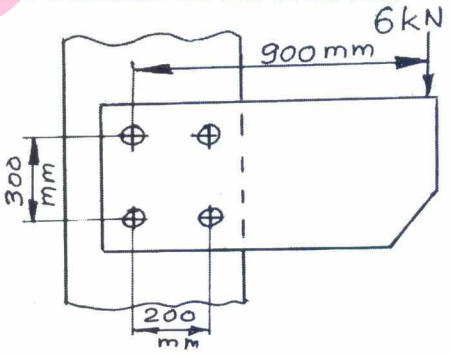


Fig.Q4(b) **(14 Marks)**

## PART – B

5 a. Write the advantages of hallow shafts over solid shafts. **(04 Marks)**

b. A shaft is supported on two bearings at a distance of 900 mm. A pulley 600 mm diameter weighing 1200 N is mounted on it at 300 mm to the left of right bearing and receives a power of 9 kW at 450 rpm. The power is given out through a pinion 270 mm diameter mounted at 300 mm to the right of left bearing. The belt drive is horizontal and the pinion drives with a downward tangential force. The belt tensions ratio is 3:1. The combined shock and fatigue factors in bending and torsion may be taken as 2 and 1.5 respectively. Find suitable diameter of the shaft taking allowable tensile and shear stresses as 75 MPa and 54 MPa respectively. **(16 Marks)**

6 a. Design a knuckle joint to sustain a tensile load of 90 kN. The allowable stresses for rods and pin are 90 MPa in tension, 60 MPa in shear and 150 MPa in crushing. **(10 Marks)**

b. Design a CI flange coupling to transmit 15 KW at 1200 rpm. The allowable shear stress for CI flange is 3 MPa and for shaft, keys and bolts is 75 MPa. The allowable bearing stress for key is 150 MPa. **(10 Marks)**

7 a. Design a double riveted double strap butt joint for the longitudinal seam of a boiler of diameter 1.2 m and a steam pressure of 2 MPa. The following stresses may be used:
Allowable tensile stress for plates = 90 MPa
Allowable shear stress for rivets = 60 MPa
Allowable crushing stress for rivets = 135 MPa.
Assume a joint efficiency of 75%. **(10 Marks)**

b. Determine the size of weld for a bracket welded as shown in Fig.Q7(b). The allowable stress in the weld is 75 MPa.

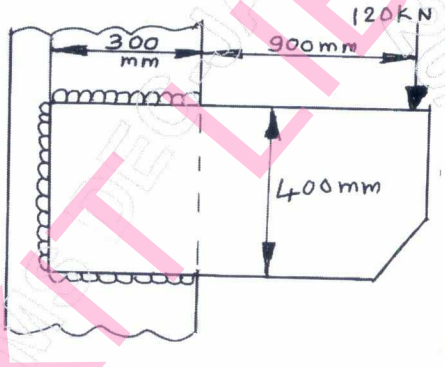


Fig.Q7(b) **(10 Marks)**

8 a. Derive expression for maximum efficiency of a square threaded screw. **(05 Marks)**

b. The lead screw of a lathe machine has a single start ISO trapezoidal threads of 30 mm outside diameter and 6 mm pitch. It drives a tool carriage against a cutting force of 6 kN at a speed of 720 mm/min. The end of the screw is carried on a thrust washer of outside and inside diameters of 50 mm and 30 mm. the coefficient of thread friction is 0.12 and that for collar is 0.15. Find:
i) The torque required to drive the carriage.
ii) Power of motor.
iii) The efficiency.
iv) Compressive stress induced in the screw.
v) Length of bronze not required taking allowable bearing pressure in the threads as 1.5 MPa. **(15 Marks)**

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10ME53

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
## Energy Engineering

Time: 3 hrs. Max. Marks:100

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





## PART – A

1 a. What is pulverized coal? **(02 Marks)**

b. Explain with sketch overfeed and underfeed principle of firing coal. **(09 Marks)**

c. Sketch and explain a cyclone Burner with advantages and disadvantages. **(09 Marks)**

2 a. Explain the Velox steam generator, with a neat sketch. **(06 Marks)**

b. Classify different types of Draughts and explain with a neat sketch the balanced draught. **(06 Marks)**

c. Calculate the mass of flue gases flowing through the chimney when the draught produced is equal to 2 cm of water, temperature of flue gases is 300°C and ambient temperature is 20°C. The flue gases formed per kg of fuel burnt are 25 kg. Neglect the losses and take the diameter of the chimney as 1.9 metre. **(08 Marks)**

3 a. Draw a line diagram to show the layout of diesel power plant. **(05 Marks)**

b. Explain different methods of starting the diesel engine. **(07 Marks)**

c. For a diesel power station. Discuss briefly about the following:
(i) Cooling system (ii) Lubricating system. **(08 Marks)**

4 a. How are the hydro-electric power plant classified? With a neat sketch, explain the pumped storage plant. **(08 Marks)**

b. The run off data of a river at a particular site is tabulated below:

| Month | Mean discharge per month (millions of cu.m) |
|---|---|
| January | 40 |
| February | 25 |
| March | 20 |
| April | 10 |
| May | 0 |
| June | 50 |
| July | 75 |
| August | 100 |
| September | 110 |
| October | 60 |
| November | 50 |
| December | 40 |

i) Draw a hydrograph and find the mean flow.
ii) Draw the flow duration curve.
iii) Find the power in MW available at mean flow, if the head available is 90 m and overall efficiency of generation is 86%.
Take each month of 30 days. **(12 Marks)**

## PART – B

5 a. What is Nuclear fusion? How does it differ from nuclear fission? **(04 Marks)**

b. Explain the Boiling water reactor, with a neat sketch. **(08 Marks)**

c. Explain :

(i) Thermal utilization factor.

(ii) Multiplication factor.

(iii) Disposal of radioactive wastes. **(08 Marks)**

6 a. Sketch and explain the working of Pyranometer. **(06 Marks)**

b. Sketch and explain the principle of working of solar pond. **(08 Marks)**

c. Calculate the angle made by beam radiation with the normal to a flat-plate collector on May 1 at 0900h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E). It is tilted at an angle of 36° with the horizontal and is pointing down South. **(06 Marks)**

7 a. What are the advantages and limitations of Tidal power generation? **(08 Marks)**

b. With a neat sketch, explain the closed cycle OTEC plant. **(08 Marks)**

c. Briefly write a note on geothermal energy. **(04 Marks)**

8 a. What are the factors affecting biogas generation? Explain any two factors. **(05 Marks)**

b. Explain with neat sketch of Indian Bio-gas plant. **(10 Marks)**

c. In brief write a note on energy plantation. **(05 Marks)**

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10ME54

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
## 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 principle of virtual work with an example. **(04 Marks)**

b. In the following Fig. Q1 (b) a 4-bar mechanism is shown. Calculate the required value of $T_2$ and various forces on links for the equilibrium of the system. **(16 Marks)**

AB = 50 mm, BC = 66 mm, CD = 55 mm, CE = 25 mm, CF = 30 mm, BAD = 60° and AD = 100 mm

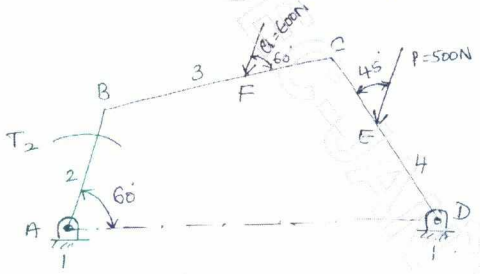


Fig. Q1 (b)

2 a. Explain the function of flywheel and show how its size and mass may be calculated by the aid of turning moment diagram. **(06 Marks)**

b. A punching press is required to punch 40 mm diameter holes in a plate of 15 mm thickness at the rate of 30 holes per minute. It requires 6 N-m of energy per $mm^2$ of sheared area. If the punching takes $\frac{1}{10}$ of a second and the rpm of the flywheel varies from 160 to 140. Determine the mass of the flywheel having radius of gyration of 1 metre. **(14 Marks)**

3 a. Derive an expression for frictional torque in a conical pivot bearing. Assume uniform pressure across the bearing surface. **(06 Marks)**

b. A belt drive is required to transmit 10 kW from a motor running at 600 rpm. The belt is 12 mm thick and has a mass density of 0.001 $gm/mm^3$. Safe stress in the belt is not to exceed 2.5 $N/mm^2$. Diameter of the driving pulley is 250 mm whereas the speed of the driven pulley is 220 rpm the 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 by analytical method. **(04 Marks)**

b. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°C and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm. Find their magnitudes and angular positions. **(16 Marks)**

## PART – B

5 a. What are in-line engines and state how they are balanced? **(06 Marks)**

b. A four cylinder vertical engine has cranks 150 mm long. The planes of rotation of the first, second and fourth cranks are 400 mm, 200 mm and 200 mm respectively from the third crank and their reciprocating masses are 50 kg, 60 kg and 50 kg respectively. Find the mass of the reciprocating parts for the third cylinder and relative angular positions of the cranks in order that the engine may be in complete primary balance. **(14 Marks)**

6 a. Define height of the governor and derive an expression for the height of the Hartwell governor. **(06 Marks)**

b. The arms of a porter governor are 300 mm long. The upper arms are pivoted on the axis of rotation. The lower arms are attached to a sleeve at a distance of 400 mm from the axis of rotation the mass of the load on the sleeve in 70 kg and the mass of each ball is 10 kg. Determine the equilibrium speed when the radius of rotation of the balls is 200 mm. If the friction is equivalent to a load of 20 N at the sleeve. What will be the range of speed for this position? **(14 Marks)**

7 a. Explain the effect of Gyroscopic couple on Navalship when it is steering and pitching. **(06 Marks)**

b. Each wheel of a four wheeled, rear engine automobile has a moment of inertia of 2.4 $kgm^2$ and an effective diameter of 660 mm. The rotating parts of the engine have a moment of inertia of 1.2 $kgm^2$. The gear ratio of engine of the back wheel is 3 to 1. The engine axis is parallel to the rear axle and the crankshaft rotates in the same sense as the road wheels. The mass of the vehicle is 2200 kg and the centre of the mass is 550 mm above the road level. The tack width of the vehicle is 1.5 m. Determine the limiting speed of the vehicle around a curve with 80 m radius so that all the four wheels maintain contact with the road surface. **(14 Marks)**

8 The following particulars relate to symmetrical circular cam operating a flat faced follower least radius = 16 mm, nose radius = 3.2 mm, distance between cam shaft centre and nose centre = 25 mm, angle of action of cam = 150°, and cam shaft speed = 600 rpm. Assuming that there is no dwell between ascent and descent. Determine the lift of the value, the flank radius and acceleration and retardation of the follower at the beginning of lift and apex of the nose. **(20 Marks)**

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10ME55

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## 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. Differentiate clearly between wrought product and cast product. **(05 Marks)**

b. State the advantages and limitations of metal working processes. **(05 Marks)**

c. Show tri-axial stress system, with a neat figure and also represent the same in a matrix form. **(05 Marks)**

d. What is flow stress? Name the methods to determine the flow stress. **(05 Marks)**

2 a. Explain the effect of friction, lubrication and strain rate on metal working process. **(06 Marks)**

b. What is hydrostatic pressure? Explain the importance in achieving a successful forming operation without fracture. **(06 Marks)**

c. Discuss the concept of deformation zone geometry in metal working. **(08 Marks)**

3 a. Derive an expression for forging pressure and load in open die forging by slab analysis (considering sliding occurs at interface). Hence draw the friction hill. **(10 Marks)**

b. A rectangular bar of length 200 mm, width 100 mm and thickness 40 mm is compressed between two flat dies in plane strain condition such that the plane sections remain same and dimension 200 mm does not change. If the yield strength of the work material is 75 $N/mm^2$ and coefficient of friction $\mu = 0.08$, determine the minimum, average and maximum die pressure at the beginning of compression. **(10 Marks)**

4 a. Explain the following with neat figures:
i) Four high rolling mill
ii) Cluster rolling mill
iii) Tandum mill
iv) Planetary rolling mill **(12 Marks)**

b. Determine the maximum possible reduction for cold rolling of a 300 mm thick slab when $\mu = 0.08$ and roll diameter is 600 mm. What is the maximum reduction on the same mill for hot rolling when $\mu = 0.5$? **(08 Marks)**

### PART – B

5 a. What is drawing process? Draw the cross section of a drawing die and explain the different elements of drawing die. **(08 Marks)**

b. What is redundant work in drawing? How it is estimated? **(08 Marks)**

c. A steel wire is drawn from an initial diameter of 6 mm to a final diameter of 5.2 mm. the angle die is 18°, the coefficient of friction at the die-wire interface is 0.15 and the yield strength of the material is 255 $N/mm^2$. Calculate the drawing stress in the absence of back tension. **(04 Marks)**

6 a. How seamless pipes and tubes can be produced by extrusion? Explain with a neat sketch. **(08 Marks)**

b. Briefly explain four extrusion defects with their causes and remedies. **(08 Marks)**

c. It is required to extrude a cylindrical aluminium billet of 50 mm diameter to 10 mm diameter. The length of the billet is 75 mm and the average tensile yield stress for aluminium material is 170 $N/mm^2$. Calculate the force required for extrusion. Assume $\mu = 0.15$ and semi-die angle = 45°. **(04 Marks)**

7 a. Explain briefly the rubber forming process with respect to sheet metal forming. **(05 Marks)**

b. Explain with neat sketch progressive die. **(05 Marks)**

c. Explain the effect of anisotropy on limited draw ratio (LDR) in deep drawing. **(05 Marks)**

d. A 25 mm square hole is to be cut in sheet metal of 0.75 mm thick. The shear strength of the material is $2.86 \times 10^5$ $kN/m^2$. Calculate the cutting force. **(05 Marks)**

8 a. Discuss the principle and application of electro hydraulic forming. **(08 Marks)**

b. What are the advantages and disadvantages of high energy rate forming (HERF)? **(06 Marks)**

c. Discuss briefly the processing stages of powder metallurgy. **(06 Marks)**

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10ME56

# Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
## Turbomachines

Time: 3 hrs. Max. Marks:100

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



## PART – A

1 a. Define turbo machines. Give at least 6 different classifications of turbomachines. **(08 Marks)**

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

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

c. A turbine model of 1 : 10 develops 2.0 kW under a head of 6 m at 500 rpm. Find the power developed by the prototype under a head of 40 m. Also find the speed of prototype and its specific speed. Assume the turbine efficiencies to remain same. **(06 Marks)**

2 a. For power generating turbo machine, define (i) total-to-total efficiency (ii) total-to-static efficiency. **(04 Marks)**

b. With the help of h-s diagram, show that the preheat factor in a multi stage compressor is less than unity. **(06 Marks)**

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

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

b. The velocity of fluid flow from the nozzle in an axial flow impulse turbine is 1200 m/s. The nozzle angle is 22°. If the rotor blades are equiangular and the rotor tangential speed is 400 m/s, find : (i) The rotor blade angles, (ii) The tangential force on the blade ring (iii) Power output (iv) Utilization factor. Assume $V_{r_1} = V_{r_2}$. **(10 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,

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

b. An axial flow compressor of 50% reaction design has blades with inlet and outlet angles of 44° and 13° respectively. The compressor is to produce a pressure ratio 5 : 1 with an overall isentropic efficiency of 87% when the inlet temperature is 290 K. The mean blade speed and axial velocity are constant throughout the compressor. Assume that blade velocity is 180 m/s and work input factor is 0.85, Find the number of stages required and the change of entropy. **(10 Marks)**

## PART – B

5 a. What is the necessity for compounding steam turbines? Discuss any two methods of compounding with neat sketches. **(10 Marks)**

b. Steam issues from the nozzle of a Delaval turbine with a velocity of 1000 m/s. The nozzle angle is 20° and the mean blade velocity 400 m/s. Inlet and outlet angles are equal. Mass of steam flowing through the turbine is 1000 kg/h. Calculate (i) Blade angles (ii) Relative velocity of steam entering the blades. (iii) Axial thrust (iv) Power developed (v) Blade efficiency. Assume K = 0.8. **(10 Marks)**

6 a. Explain the functions of a draft tube in a reaction hydraulic turbine. **(04 Marks)**

b. Draw the inlet and outlet velocity triangles for a Pelton wheel. Derive an expression for the maximum hydraulic efficiency of a Pelton wheel in terms of bucket velocity co-efficient and discharge blade angle. **(08 Marks)**

c. A Kaplan turbine develops 10 MW under an effective head of 8 m. The overall efficiency is 0.86, the speed ratio is 2.00 and the flow ratio is 0.6. The hub diameter is 0.35 times the outside diameter of the wheel. Find the diameter and speed of the turbine. **(08 Marks)**

7 a. Explain the following, with reference to the centrifugal pump:
(i) Slip and it effects
(ii) Cavitation, its effect and remedies to it
(iii) Difference between manometric head and NPSH. **(10 Marks)**

b. The outer diameter of the impeller of a centrifugal pump is 40 cm, and width of the impeller at outlet is 5 cm. The pump is running at 800 rpm and is working against a total head of 15 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. (iv) Discharge. **(10 Marks)**

8 a. What is radial equilibrium in an axial flow compressor? Derive an expression for radial equilibrium in terms of flow velocity and whirl velocity of a fluid. **(10 Marks)**

b. A centrifugal compressor runs at a speed of 15000 rpm and delivers air at 20 kg/s. Exit radius is 0.35 m, relative velocity and vane angles at exit are 100 m/sec and 75° respectively. Assuming axial inlet and inlet stagnation temperature and stagnation pressure as 300 K and 1 bar respectively. Calculate : (i) the torque (ii) the power required to drive the compressor (iii) the ideal head developed (iv) the work done and (v) the exit total pressure. Take $C_p$ of air = 1.005 kJ/kg-K. **(10 Marks)**

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