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10AL51

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Management & Entreprenueurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Give an example for each of the managerial functions and explain the same. **(10 Marks)**
b. Explain any five principles of management as formulated by Fayol. **(10 Marks)**

2 a. List and explain the steps in planning. **(10 Marks)**
b. List any five types of plans and explain each briefly. **(10 Marks)**

3 a. What is span of control and what factors affect it? Explain. **(10 Marks)**
b. Explain recruitment and selection. What is MBO and MBE? **(10 Marks)**

4 a. How does Maslow's heirarchy of needs help a manager to motivate his subordinates? Explain. **(10 Marks)**
b. List Hygience and motivation factors as per Herzberg and explain their implications. **(10 Marks)**

PART – B

5 a. List the stages of entrepreneur process and expalin any one of them. **(10 Marks)**
b. List the characteristics of an entrepreneur and explain any one of them. **(10 Marks)**

6 a. List the characteristics of small scale industry (SSI) and explain the need for SSI in the economy of a country. **(10 Marks)**
b. What are the steps involved in starting SSI? Explain one of them. **(10 Marks)**

7 a. List some state level agencies which support SSI and explain one of them as to how they assist the SSIs. **(10 Marks)**
b. What are the schemes of finance provided by SIDBI? Explain one of the schemes. **(10 Marks)**

8 Write notes on:
a. Market feasibility study
b. Financial feasibility study.
c. Technical feasibility study.
d. Economic feasibility study. **(20 Marks)**

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10ME52

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
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 machine design data handbook is permitted.

PART – A

1 a. A 50 mm steel rod supports a 9 kN load and in addition to this a torsional moment of 100 N-m is applied on it as shown in Fig.Q1(a). Determine the maximum tensile and maximum shear stresses. **(10 Marks)**

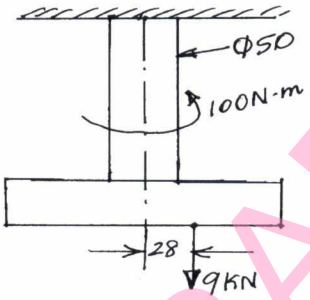

Fig.Q1(a)

b. Briefly discuss three dimensional stress field and stress tensor. **(10 Marks)**

2 a. A mild steel shaft of 60 mm diameter is subjected to bending moment of 25×10^5 N-mm and torque M_t . If the yield stress in tension is 300 N/mm^2, find the maximum value of torque without causing yielding of the shaft according to
i) Maximum shear stress theory of failure and ii) Maximum distortion theory of failure.
Adopt a factor of safety of 1.5. **(10 Marks)**

b. A mass of 500 kg is being lowered by means of steel wire rope having cross sectional area 250 mm^2. The velocity of the weight is 0.5 m/sec, when the length of the extended rope is 20 m, the sheave gets stuck up. Determine the stress induced in the rope due to sudden stoppage of the sheave. Neglect friction. Take E = 190 GPa. **(10 Marks)**

3 A transmission shaft carries a pulley midway between two bearings. The bending moment at the pulley varies from 200 N-m to 600 N-m, as the torsional moment of the shaft varies from 70 N-m to 200 N-m. The frequencies of variation of bending and torsional moments are equal to the shaft speed. The shaft is a made of steel FiE 400 (σ_U = 540 MPa, σ_{yt} = 400 MPa). The corrected endurance strength of the shaft is 200 MPa. Determine the diameter of the shaft using a factor of safety of 2. **(20 Marks)**

4 a. An M10 steel bolt of 125 mm long is subjected to an impact load. The kinetic energy absorbed by the bolt is 2.5 J. Determine: i) Stress in the shank of the bolt if there is no threaded position between the nut and the bolt head. ii) Stress in the shank if the area of the shank is reduced to that of the root area of the thread or the entire length of bolt is threaded. **(10 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 1 and 2 is 200 mm. All the 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 the bolts. **(10 Marks)**

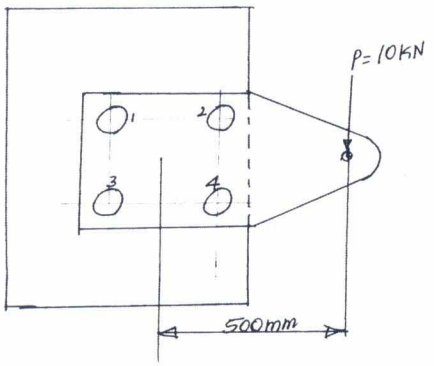

Fig.Q4(b)

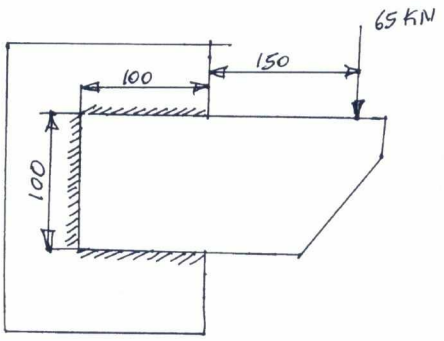

Fig.Q7(a)

PART – B

5 A horizontal piece of commercial shafting is supported by two bearings 1.5 m apart. A keyed gear, 20° involute and 175 mm in diameter, is located 400 mm to the left of the right bearing and is driven by a gear directly behind it. A 600 mm diameter pulley is keyed to the shaft 600 mm to the right of the left bearing and drives a pulley with a horizontal belt directly behind it. The tension ratio of the belt is 3 to 1 with a slack side on top. The drive transmits 45 kW at 330 rpm. Take $C_m = C_t = 1.5$. Calculate the necessary shaft diameter and angular deflection in degrees. Use allowable shear stress 40 MPa and $G = 80\times10^9$ N/m^2. **(20 Marks)**

6 a. Design a cast iron flange coupling to connect two shafts of 45 mm diameter is to transmit 20 kW power at 400 rpm. The permissible shear strength for the shaft, bolt and key is 50 N/mm^2 and the permissible compressive stress is 120 N/mm^2. The permissible shear strength for cast iron is 15 N/mm^2. Assume starting torque is 30 percent higher than the nominal torque. Design the coupling assuming the bolts are fitted in reamed holes. **(12 Marks)**

b. Design the assembly of a knuckle joint to connect two mild steel rods subjected to an axial pull of 100 kN. The allowable stress for rods and pin are 100 MPa, 130 MPa and 60 MPa in tension, crushing and shear respectively. The bending of the pin is prevented by selection of proper fit. **(08 Marks)**

7 a. Determine the size of the weld required for an eccentrically loaded weld as shown in Fig.Q7(a). Assume steady load and fillet weld. **(08 Marks)**

b. Design a triple rivetted butt joint to join two plates of thickness 10 mm. The pitch of rivets in the extreme rows, which are in single shear is twice the pitch of rivets in the inner rows which are double shear. The design stresses of the materials of the main plate and the rivets are as follows:

For plate material in tension $\sigma_t = 120$ MPa, for rivet material in compression $\sigma_c = 160$ MPa, for rivet material in shear $\tau = 80$ MPa. **(12 Marks)**

8 a. Explain self locking and overhauling 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 stresses. Take FOS = 2, assume 25% overload for screw rod design. **(16 Marks)**

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10ME53

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
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 working of spreader stoker. State the advantages and disadvantages. **(10 Marks)**

b. With a neat sketch, explain hydraulic ash handling system. **(06 Marks)**

c. List the different types of fuels used for steam generation. **(04 Marks)**

2 a. Explain with a neat sketch, working of Volex boiler. **(08 Marks)**

b. Draw the neat sketch of Induced Draugh system. Explain. **(08 Marks)**

c. What are Super heaters and Economiser? **(04 Marks)**

3 a. Explain the necessity of cooling system in diesel engine. With the help of neat sketch, explain thermostat cooling and thermisiphon cooling. **(08 Marks)**

b. Draw schematic layout of diesel power plant and explain function of the components. **(12 Marks)**

4 a. Classify Hydro – electric power plant. **(04 Marks)**

b. Explain with neat sketches, any three different types of surge tank. **(06 Marks)**

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

Month	Mean Discharge in millions of cu/month	Month	Mean Discharge in millions of cu/month
Jan	40	July	70
Feb	25	Aug	100
Mar	20	Sept	105
Apr	10	Oct	60
May	0	Nov	50
June	50	Dec	40

i) Draw 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 100m and overall efficiency of generation is 80%. **(10 Marks)**

PART - B

5 a. With the help of neat diagram, explain the working of Liquid Metal Cooled Reactor. **(08 Marks)**

b. Explain about disposal of solid, liquid and gaseous wastes produced by Nuclear Power Plant. **(07 Marks)**

c. Explain advantages and disadvantages of Nuclear power plant. **(05 Marks)**

6 a. Draw a neat sketch, explain Solar Pond Electric Power Plant. Draw concentration and temperature profile. **(08 Marks)**

b. Briefly explain the working of solar cell. **(04 Marks)**

c. Wind blows with velocity of 16m/s at 15^0C. The turbine diameter is 115m with operating speed of 40 rpm at maximum efficiency. Assume 1 standard atmospheric pressure and propeller wind turbine. Calculate the following :
i) Total power density in the wind stream ii) Maximum obtainable power density
iii) Reasonably obtainable power density, $\eta = 35\%$ iv) Total power
v) Torque and axial thrust. **(08 Marks)**

7 a. With a neat sketch and TS diagram, explain closed cycle OTEC. **(07 Marks)**
b. Draw a neat sketch and explain the working of Double basin tidal power plant. **(06 Marks)**
c. With a neat sketch, explain the working of Vapour dominated – total flow concept Geothermal system. **(07 Marks)**

8 a. Explain the factors affecting Biogas generation. **(10 Marks)**
b. With a neat sketch, explain the working of Updraft gasifier. Mention the temperature ranges. **(07 Marks)**
c. Write a note on Energy plantation. **(03 Marks)**

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10ME54

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Dynamics of Machines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. State the conditions for the equilibrium of the following systems: i) Two force member; ii) Three force member; iii) Member with two forces and a torque. **(08 Marks)**

b. Determine the required input torque on the crank of a slider crank mechanism shown in Fig.Q.1(b) for static equilibrium. **(12 Marks)**

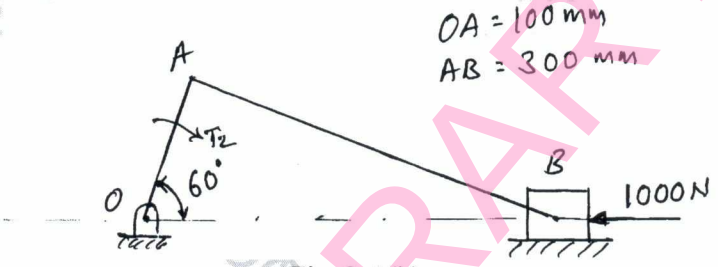

Fig.Q.1(b)

2 In a machine, the intermittent operations demand the torque to be applied as follows. During the first half revolution, the torque increases uniformly from 800 N-m to 3000 N-m. During next one revolution, the torque remains constant. During next one revolution, the torque decreases uniformly from 3000 N-m to 800 N-m. During last 1½ revolution, the torque remains constant.

Thus a cycle is completed in 4 revolutions. The motor to which the machine is coupled exerts a constant torque at a mean speed of 250rpm. A flywheel of mass 1800kg and radius of gyration of 500mm is fitted to the shaft. Determine: i) The power of the motor; ii) the total fluctuation of speed of the machine shaft. **(20 Marks)**

3 a. State two laws of friction. **(05 Marks)**

b. A belt drive is required to transmit power from a motor running at 900rpm. The diameter of the driving pulley of the motor is 300mm. The driven pulley runs at 300 rpm and the distance between centres of two pulleys is 3m. The width and thickness of belt are 80mm and 10mm respectively. The density of belt material is 1000kg/m^3. The maximum allowable stress in belt material is 2.5 MPa. Te coefficient of friction between belt and pulley is 0.3. Assume open belt drive and neglect slip in belt drive. Determine the power transmitted by the belt drive. **(15 Marks)**

4 a. Define static and dynamic balancing. **(05 Marks)**

b. A rotating shaft carries 4 masses A, B, C and D at radii 100, 125, 200 and 150mm respectively. The planes in which the masses revolve are spaced 600mm apart and the masses B, C and D having 10, 5 and 4 kg respectively. Find the required mass A and the relative angular positions of 4 masses to keep the shaft in balance. **(15 Marks)**

PART – B

5 The cranks and connecting rods of a 4 cylinder in-line engine rotating at 1800rpm are 60mm and 240mm each respectively. The cylinders are spaced at 150mm apart and are numbered 1 to 4 in sequence from one end. The cranks appear at intervals of 90° in an end view in the order 1-4-2-3. The reciprocating mass corresponding to each cylinder is 1.5kg. Determine:
a. Unbalanced primary and secondary forces, if any.
b. Unbalanced primary and secondary couples with reference to central plane of the engine. **(20 Marks)**

6 a. Define the following terms with respect to governors: i) Sensitiveness; ii) Isochronism; iii) Controlling force; iv) Governor power. **(08 Marks)**
b. In a spring loaded Hartnell type governor, the extreme radii of rotation of the balls are 80mm and 120mm. The ball and sleeve arms of the bell crank lever are equal in length. The mass of each ball is 2kg. If the speeds at the two extreme positions are 400 and 420rpm. Find: i) The sleeve lift; ii) Stiffness of the spring; iii) Initial compression of the spring. **(12 Marks)**

7 a. With neat sketches, explain the effect of gyroscopic couple on steering of aeroplane, when it takes a right turn. The engine runs in clockwise when viewed from rear. **(06 Marks)**
b. Each wheel of a motor cycle is of 600mm diameter and has a moment of inertia of 1.2 kg-m^2. The total mass of the motor cycle and rider is 180kg and the combined centre of mass is 580mm above the ground level when the motor cycle is upright. The moment of inertia of the rotating parts of the engine is 0.2 kg-m^2. The engine speed is 5 times the speed of the wheels and is in the same sense. Determine the angle of heel necessary when the motor cycle takes a turn of 35m radius at a speed of 54 kmph. **(14 Marks)**

8 a. For a circular arc cam with flat faced follower, derive expressions for velocity and accelerations of the follower when it is touching the circular flank. **(10 Marks)**
b. A tangent cam with a base circle diameter of 50mm operates a inline roller follower of diameter 20mm. The angle between the tangential faces of cam is 60°, speed of the cam shaft 200rpm and lift of the follower 15mm. Determine:
i) The main dimensions of the cam.
ii) The acceleration of the follower at the beginning of lift. **(10 Marks)**

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10ME55

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015

Manufacturing Process – III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Briefly explain the classification of forming process based on force applied. **(10 Marks)**

b. Explain the following yield criterion:
i) Tresca's
ii) Von-Mises **(05 Marks)**

c. Derive the flow stress equation. **(05 Marks)**

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

b. Difference between cold working and hot working process. **(05 Marks)**

c. Write a note on workability of materials. **(05 Marks)**

3 a. What are the assumptions made while analyzing forces during forging? Derive the expressions for forging pressures and load in open die forging by slab analysis (sliding occurs at interface). Hence find mean forging pressure.
i) With coulomb friction at the interface.
ii) With constant friction factor at the interface. **(12 Marks)**

b. With neat sketch, explain the working of "Board-drop hammer". **(04 Marks)**

c. Explain the parameters to be considered during die design in forging. **(04 Marks)**

4 a. With neat sketch, explain different types of rolling mill arrangements. **(10 Marks)**

b. Explain the defects of rolled product. **(05 Marks)**

c. In rolling a slab from 35 to 30 mm calculate the coefficient of friction and the length of arc of contact. Take the value of roll radius as 250 mm. **(05 Marks)**

PART – B

5 a. What is drawing process? Explain. **(05 Marks)**

b. What are the drawing variables? Explain briefly. **(05 Marks)**

c. Classify the different process used in tube drawing. With the help of suitable sketch, explain any one process. **(05 Marks)**

d. Explain optimal cone angle and dead zone formation in drawing. **(05 Marks)**

6 a. Give the classification of extrusion process and explain hydrostatic extrusion process with neat sketch. **(07 Marks)**

b. Explain clearly the variables influencing extrusion process. **(07 Marks)**

c. It is required to extrude a cylindrical aluminum billet of 50 mm diameter to 10 mm diameter. The length of the billet is 75 mm and the average tensile yield stress for aluminum material is 170 N/mm^2. Calculate the force required for extrusion. Assume $\mu = 0.15$ and semi-die angle = 45°. **(06 Marks)**

7 a. With neat sketch, explain the working of "progressive" and "compound die" arrangement in sheet metal working. **(10 Marks)**

b. Explain the forming limit diagram. **(05 Marks)**

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

8 a. Discuss the principle of working, advantages and application of:
i) Explosive forming
ii) Electro hydraulic forming **(10 Marks)**

b. Explain the "atomization" method of powder production in powder metallurgy. **(05 Marks)**

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

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10ME56

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Turbomachines

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Use of steam tables and thermodynamic data hand book is permitted.

PART – A

1 a. Explain the significance of first and second law of thermodynamics applied to a trubomachine. **(06 Marks)**

b. Define the specific speed of a pump. Obtain an expression for the same in terms of discharge, speed and head. **(06 Marks)**

c. A one-fourth scale turbine model is tested under a head of 10 metres. The prototype is required to work under a head of 30 metres and to run at 425rpm. Estimate the speed of the model if it develops 125 kW and uses 1.1 m^3/s of water at this speed. Also calculate the power output of the prototype and suggest the type of turbine. **(08 Marks)**

2 a. Explain static and stagnation state for a fluid. **(04 Marks)**

b. What is reheat factor? Show that reheat factor is greater than unity. **(06 Marks)**

c. A multistage axial flow compressor, the air is taken at 1 bar and 15°C and compressed to a pressure of 6.4 bar. The final true temperature is 300°C due to the compression process. Determine the overall compression efficiency and also the polytropic efficiency. Determine the number of stages required if the true temperature rise is limited to 13°K for each stage. Assume polytropic efficiency is equal to stage efficiency. **(10 Marks)**

3 a. Derive utilization factor for a turbine. Derive an expression relating utilization factor with degree of reaction for an axial flow turbine. **(10 Marks)**

b. The mean rotor blade speed of an axial flow turbine stage with 50% reaction is 210 m/s. Steam emerges from the nozzle inclined at 28° to the plane of the wheel with axial component equal to blade speed. Assuming symmetric inlet and outlet velocity triangles, determine the rotor blade angle and utilization factor. Also determine the degree of reaction to make the utilization maximum if the axial velocity, blade speed, as well as nozzle angle remain the same. **(10 Marks)**

4 a. Draw the velocity diagram for a power absorbing radial flow turbo machine and show that $R = \frac{1}{2}\left[1 + \frac{V_{m_2} \cot \beta_2}{U_2}\right]$. **(10 Marks)**

b. Draw the velocity triangles at inlet and outlet of an axial flow compressor from the following data. Degree of reaction 0.5, inlet blade angle 45°, axial velocity of flow which is constant throughout 120 m/s, speed of rotation 6500 rpm, radius of rotation 20cm, blade speed at inlet is equal to blade speed at outlet. Calculate angles at inlet and outlet. Also calculate power needed to handle 1.5 kg/s of air. **(10 Marks)**

PART – B

5 a. Show that maximum blade efficiency $\eta_{\text{blade max}} = \frac{2\cos^2\alpha_1}{1+\cos^2\alpha_1}$ for a 50% reaction Parson's turbine. **(10 Marks)**

b. Steam emerging from a nozzle to a impulse De-Laval turbine with a velocity of 1000 m/s. The nozzle angle is 20°. The mean blade velocity is 400m/s. The blades are symmetrical ($\beta_1 = \beta_2$). The mass flow rate of steam is 1000 kg/hr. Friction factor is 0.8. Calculate the following: i) Blade angles; ii) Axial thrust; iii) Work done per kg of steam; iv) Power developed. **(10 Marks)**

6 a. Write a short note on draft tubes in a reaction hydraulic turbine. **(04 Marks)**

b. In a power station single jet Pelton wheel produces 23110 kW under a head of 1770m while running at 750 rpm.
Estimate: i) Jet diameter; ii) Mean diameter of the runner; iii) Number of buckets.
Assume the necessary data suitably. **(06 Marks)**

c. An inward flow reaction turbine works under a head of 110m. The inlet and outlet diameters of the runner are 1.5m and 1.0m respectively. The width of the runner is constant throughout as 150mm. The blade angle at outlet is 15°. The hydraulic efficiency is 0.9. Calculate:
i) The speed of the turbine.
ii) The blade angles.
iii) The power produced when the discharge velocity is 6m/s. **(10 Marks)**

7 a. What is minimum starting speed of a centrifugal pump? Derive an expression for the minimum starting speed. **(06 Marks)**

b. A centrifugal pump is to discharge 0.118 m^3/s of water at a speed of 1450rpm against a head of 25m. The impeller diameter is 25cm and its width at the outlet is 5cm and manometric efficiency is 75%. Calculate the vane angle at the outlet. **(06 Marks)**

c. A centrifugal pump with 1.2m diameter runs at 200rpm and pumps 1.88 m^3/s, the average lift being 6m. The angle which the vane makes at exit with the tangent to the impeller is 26° and the radial velocity of flow is 2.5 m/s. Find the manometric efficiency and the least speed to start pumping if the inner diameter being 0.6m. **(08 Marks)**

8 a. With neat sketch explain, slip, slip coefficient and slip factor. **(06 Marks)**

b. Explain the phenomenon of surging and stalling. **(04 Marks)**

c. The mean diameter of the rotor of an axial flow compressor is 0.5m and it rotates at 15000 rpm. The velocity of flow 220 m/s, is constant and the velocity of whirl at the inlet is 80m/s. The inlet pressure and temperature are 1 bar and 300°K. The stage efficiency is 0.88. The pressure ratio through the stage is 1.5. Calculate:
i) Fluid deflection angle.
ii) The degree of reaction if work done factor is 0.8. **(10 Marks)**

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