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10AL51

Fifth Semester B.E. Degree Examination, June/July 2015
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. Explain different levels of Management. **(05 Marks)**
b. Explain functional area of Management. **(05 Marks)**
c. What is the profession and administration management? **(10 Marks)**

2 a. Give any four important reasons for the performance of planning functions. **(05 Marks)**
b. Difference between strategic planning and tactical planning. **(05 Marks)**
c. What is decision making? Explain different types of decisions. **(10 Marks)**

3 a. Define an organization and explain principles of organisation. **(05 Marks)**
b. Write a brief note on the following : i) MBO ii) MBE. **(05 Marks)**
c. Discuss any two types of organization structures with highlighting their merits and demerits. **(10 Marks)**

4 a. Briefly explain the purpose of communication. **(05 Marks)**
b. Briefly explain the essentials of a sound control system. **(05 Marks)**
c. Explain Maslow's and Heryburg theories of Human motivation. **(10 Marks)**

PART – B

5 a. Who is an Enterpreneur? Explain the characteristics of an Enterpreneur. **(05 Marks)**
b. Explain the role of an Enterpreneur in economic development of any country. **(05 Marks)**
c. Explain the barrier involved in entrepreneurship. **(10 Marks)**

6 a. What is Small Scale Industry? Briefly explain the need and rationale of SSI's. **(05 Marks)**
b. Explain briefly the Government support for SSI during 5 year plan. **(05 Marks)**
c. Explain the objectives and functions of WTO. **(10 Marks)**

7 a. Write functions of District industries centers / single window concept. **(05 Marks)**
b. Write a short note on NSIC. **(05 Marks)**
c. Explain the objectives and functions provided by TECSOK and KSSIDC. **(10 Marks)**

8 a. Briefly outline the contents of a project. **(05 Marks)**
b. What is Financial and Social feasibility study? **(05 Marks)**
c. What is Project Appraisal? Explain the steps followed in project appraisals. **(10 Marks)**

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10ME52

Fifth Semester B.E. Degree Examination, June/July 2015
Design of Machine Element – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. A shaft as shown in Fig.Q.1(a) is subjected to bending land of 3kN, torque of 1×10^6 N-mm and an axial force of 15kN. Calculate the stresses at 'A' and 'B'. **(12 Marks)**

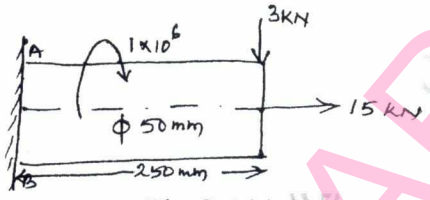

Fig.Q.1(a)

b. What is mechanical engineering design? State the steps involved in mechanical engineering design. **(04 Marks)**

c. Explain biaxial and triaxial stresses with neat sketches. **(04 Marks)**

2 a. State and explain the theories of failure applicable to i) Ductile ii) Brittle materials. **(06 Marks)**

b. What is stress concentration? Explain the factors affecting the stress concentration. **(04 Marks)**

c. A rectangular beam of 100mm width and 200mm depth is freely supported over a span of 2m. A load of 10kN is dropped on the middle of beam from a height of 10mm. Find the maximum instantaneous deflection and stress induced in the beam. Take $E = 2 \times 10^5$ MPa. **(10 Marks)**

3 a. Explain with the neat sketches, the different types of varying stresses. **(05 Marks)**

b. Write a note on S-N diagram. **(05 Marks)**

c. A steel cantilever is 200mm long. It is subjected to an axial load which varies from 150N (compression) to 450N (tension) and a transverse load at its free end which varies from 80N (up) to 120N (down). The cantilever beam is of circular in cross section having a diameter of 2d for the first 50mm and diameter 'd' for the remaining length. Determine its diameter assuming the following:

Factor of safety	= 2
Yield stress	= 330 MPa
Endurance limit	= 300 MPa
Stress concentration factor	= 1.44 for bending 1.64 for axial loading
Correction factors	= 0.7 for reverse axial loading 1 for bending
Size factor	= 0.85
Surface correction factor	= 0.9
Notch sensitivity	= 0.9

(10 Marks)

4 a. Two circular plates with 2d and d as outer and inner diameters are clamped together by means of a bolt as shown in Fig.Q.4(a). The bolt is made of plain carbon steel (σ_y = 380 MPa, E = 207 GPa) while the plates are made of aluminium [E = 71 GPa]. The initial pre load is 5kN in the bolt and external force acting on the joint is 10kN. Determine the size of bolt if factor of safety = 02. Take σ_t = 152 N/mm^2. **(08 Marks)**

b. An offset bracket is fixed to a vertical steel column by means of four bolts as shown in Fig.Q.4(b). Determine the diameter of bolts. Take σ_t = 100MPa. **(12 Marks)**

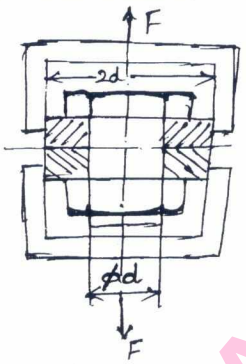

Fig.Q.4(a)

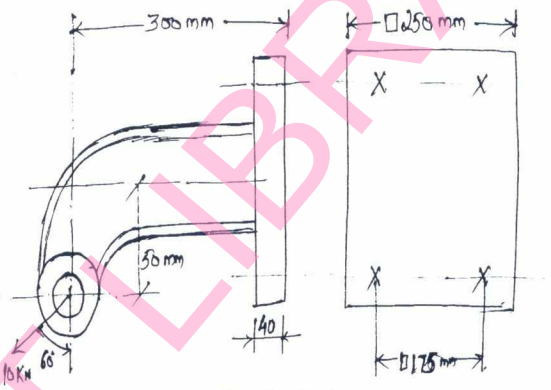

Fig.Q.4(a)

PART – B

5 A shaft is supported in bearings 600mm apart. It carries a pulley of diameter 500mm at 250mm to the right of left bearing and another pulley of diameter 380mm at 130mm to the of right bearing. The belt drive in left pulley is vertically downward while that on the right pulley is horizontal. The permissible shear stress is not to exceed 42MPa. The maximum tension in smaller pulley is not to exceed 5500N, coefficient of friction is 0.3 and angle of contact is 180°. Find the diameter of shaft. **(20 Marks)**

6 a. Design a Cotter Joint to resist a load of 12kN which acts along the axis of rod having following permissible stresses.
σ_c = 80 N/mm^2 σ_t = 40N/mm^2 and τ = 32 N/mm^2. **(10 Marks)**

b. Design a protective CI flange coupling for a steel shaft transmitting 15kW at 200rpm and having an allowable shear stress of 40MPa. The working stress in the bolt should not exceed 30MPa. Assume that the same material is used for shaft and key and the existing stress is twice its value in shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for CI is 14 MPa. **(10 Marks)**

7 a. An eccentrically loaded bracket is welded to a support as shown in Fig.Q.7(a). The permissible shear stress for the weld material is 80MPa. Determine the size of the weld. **(10 Marks)**

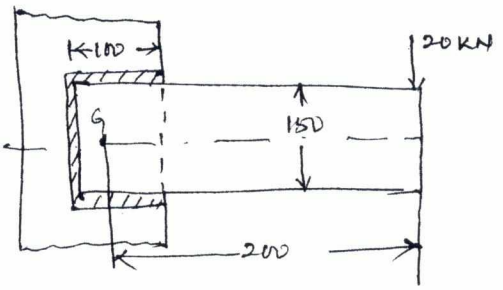

Fig.Q.7(a)

b. Two plates of 10mm thick each are to be joined by means of a single riveted double strap butt joint. Determine the rivet diameter, pitch, strap thickness and efficiency of joint. Take $\sigma_t = 80$ MPa and $\tau = 60$MPa. **(10 Marks)**

8 a. An electric motor driven power screw moves a nut in a horizontal plane against a force of 75kN at 300mm/min. The screw has a single thread of 6mm pitch on a major diameter of 40mm. The friction coefficient at screw threads is 0.1. Estimate the power of the motor. **(10 Marks)**

b. A vertical 2-start square threaded screw of 100mm mean diameter and 20mm pitch supports a vertical load of 18kN. The nut of screw is fitted in the hub of a gear wheel having 80 teeth which meshes with a pinion of 20 teeth. The mechanical efficiency of pinion and gear wheel drive is 90%. The axial thrust on screw in taken by a collar bearing 250mm outside diameter and 100mm inside diameter. Assuming uniform pressure conditions, find the diameter of pinion shaft and height of nut when friction coefficient for vertical screw and nut is 0.15 and that of collar bearing is 0.2. Take $\tau = 50$MPa and $P_b = 1.4$ MPa. **(10 Marks)**

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10ME53

Fifth Semester B.E. Degree Examination, June/July 2015
Energy Engineering

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. List out the different types of fuels used for steam generation. Briefly explain them. **(10 Marks)**

b. With a neat sketch, explain the working of travelling grate stroker. **(06 Marks)**

c. With a neat sketch, explain the working of cyclone burner. **(04 Marks)**

2 a. With a neat sketch, explain the working of Schmidt – Hartmann boiler. **(10 Marks)**

b. Explain with a neat sketch the working of hyperbolic cooling tower. **(05 Marks)**

c. Determine the height of chimney to get a net draught of 12 mm if the total draught losses are 4 mm. The temperature of air is 25°C and the temperature of chimney gases is 300°C. The mass of air used per kg of fuel is 18 kg. One kg of air occupies a volume of 0.7734 m^3 at NTP. **(05 Marks)**

3 a. Draw the schematic diagram of DG power plant. Mention the function of each component of the plant. **(10 Marks)**

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

c. Write a note on filters used in intake system of diesel engine. **(04 Marks)**

4 a. What is a surge tank? What are its functions? List out the types of surge tanks used in hydro-electric power plant. **(06 Marks)**

b. What do you mean by water hammer? How it will be formed? **(04 Marks)**

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

Month	Mean discharge millions of m^3/month	Month	Mean discharge millions of m^3/month
Jan	40	July	70
Feb	25	Aug	100
Mar	20	Sep	105
April	10	Oct	60
May	0	Nov	50
June	50	Dec	40

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

PART – B

5 a. With a neat sketch, explain the working of Fast Breeder Reactor State its advantages and disadvantages. **(10 Marks)**

b. Write a note on :
i) Radiation hazards
ii) Radioactive waste disposal. **(10 Marks)**

6 a. What is the difference between a pyrheliometer and a pyranometer? Describe the principle of Angstrom Pyrheliometer. **(06 Marks)**

b. What is the principle of photovoltaic power generation? With a neat sketch, explain the working of photovoltaic cell. **(06 Marks)**

c. Determine extraterrestrial normal radiation and extraterrestrial radiation on a horizontal surface on February 15 at 2 pm solar time for 40° N latitude. Also determine the total solar radiation on the extraterrestrial horizontal surface for the day. **(08 Marks)**

7 a. Describe the tidal energy harnessing by "Two basin with liked basin" method. **(06 Marks)**

b. List out the problems associated with OTEC power plant. **(06 Marks)**

c. With a schematic diagram, explain the working of vapour dominated geothermal power plant. **(08 Marks)**

8 a. Clearly describe the production of oxygen from photosynthesis process. **(06 Marks)**

b. With a neat sketch, explain the working of Indian type biogas plant. **(08 Marks)**

c. With a neat sketch, explain the working of fluidized bed gasifier. **(06 Marks)**

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10ME54

Fifth Semester B.E. Degree Examination, June/July 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. What is the principle of virtual work? Explain. **(06 Marks)**

b. In an I.C. engine mechanism the crank is 100mm, connecting rod is 300mm. The crank has turned by 60° from I.D.C. A force of F = 3000N acts on the Piston towards crank shaft. Determine all the forces at various points of mechanism and torque applied on crank. **(14 Marks)**

2 a. Define the terms coefficient of fluctuation of speed and coefficient of fluctuation of energy. **(04 Marks)**

b. A certain machine requires a torque of $(500 + 50 \sin\theta)$ N.m to drive it, where θ is the angle of rotation of shaft measured from certain datum. The machine is directly coupled to an engine which produces a torque of $(500 + 60 \sin 2\theta)$ Nm. The flywheel weighs 500N and has radius of gyration of 0.4m. The mean speed is 180rpm. Determine: i) Fluctuation of energy; ii) % fluctuation of speed; iii) minimum and maximum angular acceleration of flywheel and corresponding shaft positions. **(16 Marks)**

3 a. Derive an expression to find frictional torque for a flat pivot considering uniform wear theory. **(05 Marks)**

b. In a thrust bearing the external and internal radii of the contact surfaces are 210mm and 160mm respectively. The total axial load is 60kN and coefficient of friction is 0.05. The shaft is rotating at a speed of 380 rpm. Intensity of pressure is not to exceed 350 kN/m^2. Calculate: i) Power lost in friction; ii) Number of collars required for thrust bearing. **(05 Marks)**

c. A pulley is driven by a flat belt 100mm wide and 6mm thick. The density of belt material is 1000 kg/m^3. The angle of lap is 120° and the coefficient of friction is 0.3. The maximum stress in the belt is not to exceed 2 MPa. Find the maximum power that can be transmitted and corresponding speed of the belt. **(10 Marks)**

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

b. A rotating shaft carries four unbalanced masses 18kg, 14kg, 16kg and 12kg at radii 50mm, 60m, 70mm and 60mm respectively. The second, third and fourth masses revolve in planes 80mm, 160mm and 280mm respectively measured from the plane of first mass and are angularly located at 60°, 135° and 270° respectively measured anticlockwise from the first mass looking from this mass end of the shaft. The shaft is dynamically balanced by two masses, both located 50mm radii and revolving in planes midway between those of first and second masses and midway between those of third and fourth masses. Determine the magnitudes of the masses and their respective angular positions. **(15 Marks)**

PART – B

5 a. Explain direct and reverse crank method of balancing. **(10 Marks)**

b. A V-twin engine has the cylinder axes at right angle and connecting rods operate a common crank. The reciprocating mass per cylinder is 10kg. The crank is 75mm long and each connecting rod is 350mm long. Show that the engine may be balanced for primary effects by means of a revolving balance mass. If the speed of crank is 500 rpm, what is the maximum value of resultant secondary force and in which direction does it act? **(10 Marks)**

6 a. Derive an expression for determining speed of spindle of a porter governor taking into account the friction at the sleeve. **(08 Marks)**

b. In a spring loaded Hartnell governor, the extreme radii of rotation of balls are 80mm and 120mm. The ball arm and the sleeve arm of the bell crank lever are equal in length. Mass of each ball is 2kg. If the speed at the extreme positions are 400 rpm and 420 rpm, find i) spring constant and ii) Initial compression of the spring. **(12 Marks)**

7 a. Derive an expression for gyroscopic couple. **(06 Marks)**

b. With a neat sketch show the following axis of spin, axis of precession, axis of couple, planes of spin, precession and couple. **(06 Marks)**

c. An aeroplane makes a complete half circle of 50 meter radius, towards left when flying at 200 km/hr. The rotary engine and the propeller of the plane have a mass 40kg with a radius of gyration of 0.30m. The engine runs at 2400 rpm clock wise, when viewed from the rear. Find the gyroscopic couple on the plane and state its effect on it. What will be the effect, if the aeroplane turns to its right instead of left? **(08 Marks)**

8 A tangent cam with a base circle diameter of 50mm operates a roller follower 20mm in diameter. The line of stroke of the roller passes through the axis of cam. The angle between the tangential faces of cam is 60°, speed of the cam shaft 250rpm and the lift of the follower 15mm. Calculate:

a. The main dimensions of the cam

b. The accelerations of the follower at

i) The beginning of the lift

ii) Where the roller just touches the nose

iii) The apex of the circular nose. **(20 Marks)**

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10ME55

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

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

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

2 a. Explain with a neat sketch, the hydrostatic pressure in metal working. **(05 Marks)**

b. Explain the effect of following on metal working processes:
i) Friction ii) Lubrication iii) Strain rate **(15 Marks)**

3 a. List and explain die design parameters in forging. **(06 Marks)**

b. Write a note on material flow lines in forging. **(04 Marks)**

c. With a neat sketch, explain any two forging equipments. **(10 Marks)**

4 a. With neat sketches, explain the different types of rolling mills. **(10 Marks)**

b. Explain the friction hill in rolling process. **(04 Marks)**

c. A 300 mm wide aluminium alloy strip is hot rolled from an initial thickness of 25 mm to a final thickness of 15 mm. The diameter of the rolls is 1 m and speed of rotation is 120 rpm. The plane strain flow stress is 70 Mpa at the entrance of rolls and 110 Mpa at the exit from the roll gap due to increasing velocity. Find the rolling laod and power required. Assume $\mu = 0.25$ and $\lambda = 0.5$. **(06 Marks)**

PART – B

5 a. What is drawing? With a neat sketch explain the process of rod drawing. **(08 Marks)**

b. Classify the different processes used in tube drawing. With the helpof suitable sketch explain the process of moving mandrel. **(06 Marks)**

c. Explain optimal cone angle and dead zone formation in drawing. **(06 Marks)**

6 a. With a neat sketch, explain backward extrusion process. Why power involved in backward extrusion is much lesser than direct extrusion. **(07 Marks)**

b. Briefly explain the metal flow pattern in the extrusion process with and without lubrication. **(06 Marks)**

c. List and explain the various defects in extrusion. **(07 Marks)**

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

b. With neat sketches explaint the following processes:
i) Roll bending ii) Deep drawing. **(10 Marks)**

8 a. With a neat sketch, explain electrohydraulic forming process. **(06 Marks)**

b. With a flow chart explain the operations involved in making powder metallurgy parts. **(08 Marks)**

c. List the applications of powder metallurgy components. **(06 Marks)**

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10ME56

Fifth Semester B.E. Degree Examination, June/July 2015
Turbo Machines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define turbomachine. Explain the principal components of turbomachine. **(06 Marks)**

b. Define specific speed of pump. Show that specific speed of pump is given by $N_S = \frac{N\sqrt{Q}}{H^{3/4}}$. **(06 Marks)**

c. A turbine is to operate under a head of 25m at 200rpm. The discharge is 9 cumec. If the efficiency is 90%, determine the performance of the turbine under a head of 20 metres. **(08 Marks)**

2 a. What is Reheat factor? Show that the reheat factor is greater than unity in multistage turbine. **(10 Marks)**

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

3 a. Define the degree of reaction and show that the relationship between utilization factor ($\in$) and degree of reaction (R) for an axial flow turbine is given by

$$\in = \frac{V_1^2 - V_2^2}{V_1^2 - RV_2^2}.$$ **(08 Marks)**

b. Liquid water flows at the rate of 31.5 kg/s through a rotor of a radial flow turbo machine, where the inlet and outlet diameters are 125mm and 200mm respectively. The other data's relating to the turbo machine are as follows: speed = 6000 rpm, absolute velocity at inlet is 35 m/s and is axial in direction, absolute velocity at exit is 160 m/s, and its angle is 30°. Determine the relative velocities and also power required to drive the rotor in kW. Also determine the change in static and stagnation enthalpy across the rotor and change in static and stagnation pressure across the rotor and degree of reaction. **(12 Marks)**

4 a. With the help of inlet and outlet velocity triangles, show that the degree of reaction for an axial flow compressor, $R = \frac{V_a}{u}\cot\beta_m$, where V_a is axial velocity, u is blade speed and $\cot\beta_m = \frac{(\cot\beta_1 + \cot\beta_2)}{2}$, where β_1 and β_2 are inlet and outlet blade angle with respect to axial direction. **(10 Marks)**

b. A single stage axial blower with no inlet guide vanes is running at 3600 rpm. The mean diameter of the rotor is 16cm and mass flow rate of air through the blower is 0.45 kg/s. In the rotor, the air is turned such that the absolute velocity of air at exit makes an angle of 20° with respect to the axis. Assume that the axial component of fluid velocity remains constant, determine power input and degree of reaction. Assume that the density of air is constant at 1.185 kg/m^3 and area of flow is 0.02m^2. **(10 Marks)**

PART – B

5 a. What is compounding in steam turbine? Explain with neat sketch impulse-reaction turbine. **(10 Marks)**

b. In a single stage impulse steam turbine the mean diameter of the blades is 1m. It runs at 3000 rpm. The steam is supplied from a nozzle at a velocity of 350 m/s and the nozzle angle is 20°. The rotor blades are equiangular. The blade friction factor is 0.86. Draw the velocity diagram and calculate the power developed if the axial thrust is 117.72 Newton. **(10 Marks)**

6 a. Show that the maximum hydraulic efficiency of a Pelton wheel turbine is given by $(\eta_h)_{max} = \frac{(1+\cos\phi)}{2}$, where ϕ is exit blade angle. Also draw inlet and exit velocity triangles. **(10 Marks)**

b. The following data is given for a Francis turbine. Net head H = 60m; speed N = 700 rpm; shaft power = 294.3 kW, η_0 =84%, η_h = 93%, flow ratio = 0.20, breadth ratio n = 0.1, outer diameter of runner = 2 × inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine:

i) Guide blade angle.
ii) Runner vane angle at inlet and outlet.
iii) Diameter of runner at inlet and outlet and
iv) Width of wheel at inlet. **(10 Marks)**

7 a. Obtain an expression for the minimum starting speed of a centrifugal pump. **(10 Marks)**

b. The outer diameter of the impeller of a centrifugal pump is 40cm, and width of impeller at outlet is 5cm. The pump is running at 800 rpm and is working against a total head of 15m. 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. Briefly explain the following:

i) Surging of compressors.
ii) Slip factor or slip coefficient. **(10 Marks)**

b. An air compressor has eight stages of equal pressure ratio 1.35. The flow rate through the compressor and its overall efficiency are 50kg/s and 82% respectively. If the conditions of air at entry are 1.0 bar and 40°C determine: i) The state of air at the compressor exit; ii) Polytropic efficiency; iii) Efficiency of each stage; iv) Power required to drive the compressor assuming overall efficiency of the drive as 90%. **(10 Marks)**

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