Total No. of Questions : 10]

SEAT No. :

P2994

[Total No. of Pages : 3

[5154]-559

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Course) (Semester - II) (End Sem.) (402050C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Write note on: **[5]**

i) Compressible flow machines.

ii) Incompressible flow machines.

b) Explain performance characteristics curves for pumps. **[5]**

OR

Q2) a) Differentiate between compressible & incompressible flow machines. **[5]**

b) Explain the basic equation of energy transfer between fluid & rotor. **[5]**

Q3) a) Explain effect of acceleration in suction & delivery pipe on indicator diagram. **[5]**

b) A double acting reciprocating pump running at 40 rpm is discharging $1m^3$ of water per min. the pump has a stroke of 400 mm. The diameter of the piston is 200mm. the delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump. **[5]**

OR

Q4) a) What is slip in pump? Explain the meaning of negative slip. **[5]**

b) A single acting reciprocating pump has a plunger diameter 250 mm & stroke of 450 mm runs at 60 rpm. The length & diameter of delivery pipe are 60m & 100 mm respectively. Determine the power saved in overcoming friction in the delivery pipe by fitting an air vessel on the delivery side of the sump. Assume friction factor = 0.01. **[5]**

P.T.O.

Q5) a) Explain performance of axial fan with graph. **[8]**

b) How the dust erosion of centrifugal impeller does occur? What is its effect on the performance? **[8]**

OR

Q6) a) Enlist the methods to reduce the fan noise. **[8]**

b) Discuss various applications of fans & blowers. **[8]**

Q7) a) Explain UGV & DGV with velocity triangle. **[8]**

b) A centrifugal blower takes in $180 m^3$/ min of air at suction pressure of 1.013 bar & temperature of 430C and delivers it at 750 mm of W.G. taking the efficiencies of the blower and drive as 80% & 82% respectively. Determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q8) a) Write short note on selection of blowers for a desired application. **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	=	18cm
Outer diameter of the impeller	=	20cm
Speed	=	1450 rpm
relative velocity at entry	=	20 m/s
absolute velocity at entry	=	21 m/s
relative velocity at exit	=	17 m/s
absolute velocity at exit	=	25 m/s
flow rate	=	0.5 kg/s
motor efficiency	=	78%
Density of air	=	$1.25 kg/m^3$

Determine:

i) stage pressure rise

ii) degree of reaction

iii) power to drive the fan

Q9) a) Explain enthalpy-entropy diagram for centrifugal compressor. **[8]**

b) Draw velocity triangles at the entry & exit for the following axial compressor stage. **[10]**

i) $R = ½$

ii) $R < ½$

OR

Q10)a) Waht are the basic design features in axial flow compressor? **[8]**

b) Draw & explain performance curves of centrifugal compressors. **[10]**