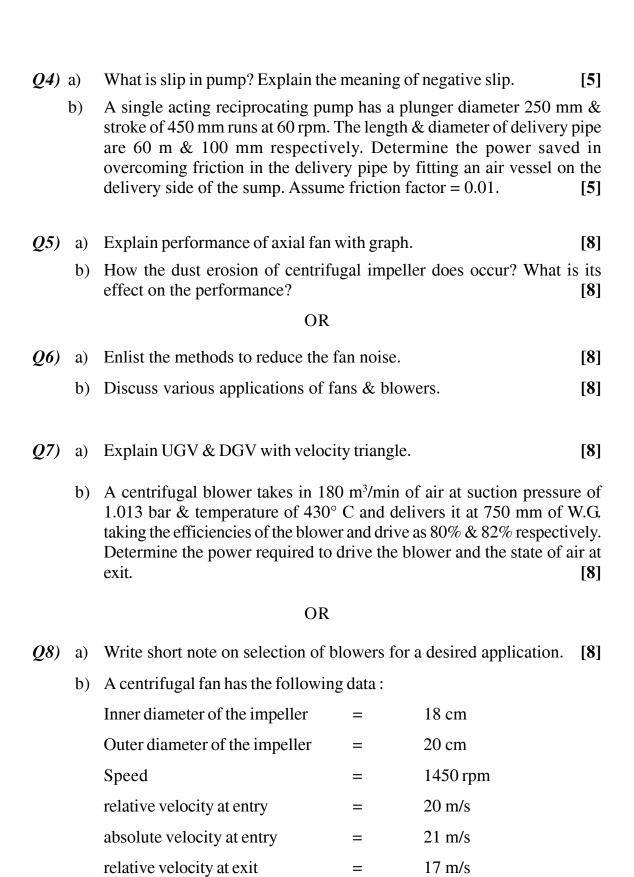**[5254] -550-A**

B.E. (Mechanical Engineering)
DESIGN OF PUMPS, BLOWERS AND COMPRESSORS
(Elective - IV) (Semester - II) (2012 Pattern)

Time : 2½ Hours]   *[Max. Marks :70*
Instructions to the candidates:

    1)   *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10*

    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]**

<div align="center">OR</div>

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 1 m^3 of water per min. the pump has a stroke of 400 mm. The diameter of the piston is 200 mm. the delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump.   **[5]**

<div align="center">OR</div>

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 60 m & 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]**

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 m³/min of air at suction pressure of 1.013 bar & temperature of 430° C 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 :

Inner diameter of the impeller	=	18 cm
Outer diameter of the impeller	=	20 cm
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

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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   **[8]**

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) $R = \frac{1}{2}$

ii) $R < \frac{1}{2}$

OR

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

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

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