Total No. of Questions :12]

SEAT No. :

P3316

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B.E. (Mech.)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Course) (Semester - I) (402044 C) (Elective -I)

Time : 3 Hours *[Max. Marks :100]*

Instructions to candidates:

1) ***Answer any 3 questions from section I and any 3 questions from section - II.***
2) ***Answers to the sections must be written in separate Answers books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION -I

Q1) a) Explain performance characteristics of pumps, compressors, fans & Blowers. **[8]**

b) Explain different Applications of compressors fans & Blowers. **[8]**

OR

Q2) a) Write equations of Energy Transfer between fluid and rotor, **[6]**

b) Explain the following Terms: **[10]**

i) Flow machines.

ii) Turbines.

iii) Pumps.

iv) Compressible flow machines.

v) Incompressible flow machines.

P.T.O.

Q3) a) Explain the various efficiencies of centrifugal pump. **[8]**

b) Explain various types of characteristic curves usually prepared for centrifugal pumps. **[8]**

OR

Q4) a) Write short notes on. **[12]**

i) Different types of losses in centrifugal pumps.

ii) Cavitation in centrifugal pumps.

b) Define specific speed. What is its significance. **[4]**

Q5) a) Explain in details design procedure of centrifugal pump. **[10]**

b) Write a short note on "Selection of pumps" **[8]**

OR

Q6) a) Explain various forms of corrosion ocurred in "Hydraulic Machines." **[10]**

b) Explain in details various Application Areas of centrifugal pump. **[8]**

SECTION- II

Q7) a) Explain design procedure & selection, optimization of blower. **[8]**

b) Write a short note on "Applications of Fans & Blowers" **[8]**

OR

Q8) a) What are main cause for noise generation? What are methods for reducing the fan noise? **[8]**

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

Q9) a) State design consideration and imperial relations used to determine various for design parameters in fans & blowers? **[8]**

b) Explain the terms Surging and Stalling **[8]**

OR

Q10)a) Write a short note on " Design procedure for selection and optimization of Blowers" **[8]**

b) Write a short note on "Design of Impeller and casing dimensions in aerodynamic design. **[8]**

Q11)a) Explain the terms degree of reaction & Slip factor? **[8]**

b) An Axial compressor stage has the following data. **[10]**

i)	Temperature and Pressure at Entry	300K,1.0bar
ii)	Degree of Reaction	50%
iii)	Mean Blade ring diameter	36cm
iv)	Rotational speed	18000rpm
v)	Blade Height at entry	6cm
vi)	Air angles at rotor and stator exit	25°
vii)	Axial velocity	180m/s
viii)	Work done factor	0.88
ix)	Stage Efficiency	85%
x)	Mechanical Efficiency	96.7%

Determine :

1) Air angles at the stator and rotor entry.

2) The mass flow rate of air.

3) The power required to drive the compressor.

4) The loading coefficient

. 5) The pressure ratio developed by the stage

6) Mach number at the rotor entry.

OR

Q12)a) Draw the velocity triangles at the entry and exit for the following axial compressor stage:- **[8]**

i) R=½

ii) R< ½

iii) R>½

b) Air enters the inducer of centrifugal compressor at Po1= 1.02 bar, To1=335 K.The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative mach number. **[10]**