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I/IV B.Tech. DEGREE EXAMINATIONS, NOV/DEC-2017

First Semester

CSE/ECE/EEE

BASIC MECHANICAL SCIENCES

Time: Three Hours **Maximum marks:60**

Answer Question No.1 Compulsory **12X1=12 M**

Answer ONE Question from each Unit **4X12=48 M**

1. Explain the following in brief:
   a) What are three basic elements of belt drive?
   b) What is meant by polygon of chain?
   c) Differentiate between flywheel and governor?
   d) What is internal energy?
   e) What is the difference between SI engine and CI engine?
   f) Mention importance of spark plug in IC engines?
   g) What is Otto cycle?
   h) Describe the air pre-heater?
   i) How do you classify the pumps?
   j) Differentiate between reciprocating and rotary compressor?
   k) Describe multistage compressor?
   l) What is the purpose of inter-cooling in compressor?

UNIT-I

2. a) Derive the expression for open belt drive?
   b) What are the differences between friction drives and gear drives?

(OR)

3. The controlling force in a spring controlled governor is 1200 N when the radius of rotation of the balls is 200 mm and 890 N when it is 120 mm. The mass of each ball is 8 kg. If the controlling force curve is a straight line, determine the controlling force and the speed of rotation when the radius of rotation is 140 mm.

UNIT-II

4. a) State the Law's of thermodynamics. What is its importance?
   b) Derive the general flow equation and state the assumptions?

P.T.O

(OR)

5. a) Differentiate between refrigeration and heat pump? How these machines satisfy the second law of thermodynamics?

   b) List the important properties that a good refrigerant should posses?

UNIT-III

6. a) Explain the working principle of fire tube boiler with a neat sketch?

   b) Describe the function of super heater with a sketch?

(OR)

7. a) What is the difference between vapour compression and vapor absorption cycle?

   b) Discuss the relative merits of NH3 and F-12 as refrigerant?

UNIT-IV

8. a) Explain the use of air chambers in pumps?

   b) Explain the working of a reciprocating pump with a neat sketch?

(OR)

9. A three stage air compressor is used to compress 1 kg of free air from 1 bar and $32^{O}C$ to 26 bars. The law of compression is $pv^{1.3}$ and R is 0.287 kJ/kgK, Assume perfect intercooling and neglecting clearance, find the minimum power required to compress 0.25 m^3/s of free air. Also find the intermediate pressures?

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I/IV B. Tech. DEGREE EXAMINATIONS, JUNE / JULY 2017
FIRST SEMESTER
BT / CSE / ECE / EEE
BASIC MECHANICAL SCIENCE

Time : **Three Hours** Maximum Marks : **60**

Answer Question No. 1 Compulsory. 12x1=12 M

Answer ONE question from each Unit. 4x12=48 M

1. Explain the following in brief :
   a) Define kinematic link and kinematic pair.
   b) Define rolling pair with one example.
   c) Explain law of gearing.
   d) Define internal energy.
   e) Define dry bulb temperature.
   f) Compare knock in SI and CI engine.
   g) What is meant by Scavenging ?
   h) What is the function of the economizer ?
   i) Explain Positive Displacement.
   j) What causes pump cavitations ?
   k) The basic function of air dryer in a compressor ?
   l) The Vertical type reciprocating compressors are used in the capacity range ?

UNIT - I

2. a) Draw a neat sketch of Whitworth's Quick return mechanism and explain its working.
   b) Write note on complete, incomplete and successfully complete constrained motion with suitable example and neat sketches.

(OR)

3. Distinguish between flywheel and governor on the basis of (i) Load (ii) Speed (iii) Turning moment diagram (iv) Application.

P.T.O.

UNIT - II

4. a) Explain and derive Isobaric process.

   b) One kg of air is compressed polytropically (n=1.3) from 1 bar and 27°C to 3 bar. Find (i) work transfer (ii) Heat transfer (iii) Change in internal energy.

(OR)

5. a) What are the basic components of I.C. Engine ? Explain at least three components with sketches.

   b) Discuss the losses because of which actual efficiency of fuel-air cycle is much lower then air standard efficiency.

UNIT - III

6. a) What are the advantages of high pressure boilers ? Discuss the guide lines for the selection of boilers for steam power plants ?

   b) Explain different types of Solid fuels used for generating steam.

(OR)

7. a) What are the desirable properties of refrigerant ? Explain the working principle of thermostat expansion device with a neat sketch.

   b) Explain psychrometric process for summer air conditioning.

UNIT - IV

8. a) Derive the expression for work done by centrifugal pump on liquid.

   b) It is required to deliver 0.048 m^3/s of water to a height of 24 m through a 150 mm diameter pipe and 120 m long by a centrifugal pump. If the overall efficiency of the pump is 75% and co-efficient of friction, f = 0.01 for the pipe line, find the power required to drive the pump.

(OR)

9. If the compressor of 200 m^3/min loads in 10 seconds and unloads in 20 seconds, calculate the amount of air leakages in the system.