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I/IV B.Tech. (Supple). DEGREE EXAMINATIONS, APRIL/MAY- 2016
First Semester
BT/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 is meant by ply of belt?

b. Describe the hunting of governor?

c. Define laws of thermodynamics?

d. What is difference between Otto cycle and diesel cycle?

e. What is the importance of injector?

f. What is the use of Steam strap?

g. Define TOR?

h. What is the importance of Ducts?

i. Describe the Air chamber?

j. What is the Priming?

k. What is the function of a reciprocating pump?

l. Describe the function of Economizer?

UNIT-I

2.   a. Derive the equation for the transmission of maximum power in belt drives?

b. What is differential gear? What are the applications of differential gear?

(OR)

3.   a. Prove that the sensitiveness of a Proell governor is greater than that of a Porter
           governor?

b. Explain the working of a Hartnell governor with a neat sketch.

UNIT-II

4.   0.5 kg of air at a pressure of 1 bar abs and 30°C is heated at constant volume untill its
      pressure is 5 bar abs. It is then expanded adiabatically to the original pressure and finally
      cooled at constant pressure to the original volume. Find the change of entropy of each
      stage and the whole system.

P.T.O

<div align="center">**(OR)**</div>

5. a. Describe the effect of compression ratio and cut-off ratio on the ideal efficiency of
    Diesel engine?

    b. An air standard Otto cycle with compression ratio 8, compression air 1 bar and 303 K.
    The maximum cycle temperature is 1273 K. Determine (i) heat supplied/kg of air
    (ii) network done and efficiency.

<div align="center">## UNIT-III</div>

6. a. Explain the working of high pressure boiler with a neat sketch?

    b. Derive an expression for the power required by forced draught and induced draught
    fan?

<div align="center">**(OR)**</div>

7. a. Explain the principle of Vapour compression refrigeration system?

    b. Explain the basic difference in terms of air conditioning effect for window and split air
    conditioners?

<div align="center">## UNIT-IV</div>

8. A centrifugal pump is required to deliver 280 liters of water/second against a head of
    16m. If the vanes of the impeller are radial at outlet and the velocity of flow is constant
    equals to 2 m/s. Find the proportions of the pump if mechanical efficiency is 80% and the
    ratio to breadth diameter at outlet as 0.1

<div align="center">**(OR)**</div>

9. a. How the use of multi stage compressor improves the volumetric efficiency?

    b. Deduce the expression for the optimum value of the intercooler pressure in a two stage
    compressor.

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I/IV B. Tech. DEGREE EXAMINATIONS, DECEMBER - 2016
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)   List type of constrained motion.

   b)   State advantages of Rope drive.

   c)   What are the type of brake used in railways ? Give the reason for the use of that brake?

   d)   What is meant by thermodynamics system ?

   e)   What is meant by surroundings ?

   f)   Why large boilers are top supported ?

   g)   Distinguish between fouling and slagging.

   h)   Explain Refrigeration effect.

   i)   Difference between single acting and double acting pump.

   j)   What is priming ?

   k)   The volumetric efficiency for reciprocating air compressors is about.

   l)   Explain the working of a rotary screw compressor.

UNIT - I

2. a)   State and explain relative velocity and acceleration of a point on link.

   b)   What is Hartnell Governor ? How it is used ? Explain with a neat diagram.

(OR)

3. Explain the effects of following action taken on belt tension adjusting mechanism.

   a)   Over tightening of belt on pulley.

   b)   Under tightening of belt on pulley.

P.T.O.

UNIT - II

4. a) Define the term COP. Differentiate Intensive and Extensive properties.

    b) A certain quantity of gas is head at constant pressure from 30°C to 165°C. Estimate the amount of heat transferred, ideal work done, change in internal energy, when the initial volume of the gas is 0.6 m^3.

(OR)

5. a) In what respect two stroke engines differs from 4-stroke engine ? Discuss.

    b) Discuss the effect of heat transfer from the following parameters on IC engines.

    (i)   Fuel air ratio.

    (ii) Compression ratio.

    (iii) Pre ignition.

UNIT - III

6. a) Steam enters the high pressure turbine at 12 MPa and 600°C and is condensed in the condenser at a pressure of 10 kPa.   If the moisture content of steam at the exit of low pressure turbine is not to exceed 12%. Determine pressure at which the steam should be reheated and thermal efficiency of the cycle.

    b) Explain with a neat sketch working of a balanced draught chimney.

(OR)

7. a) With a neat sketch explain the working of a simple absorption refrigeration system.

    b) 400 m^3/min of air at 20°C DBT and 10°C DPT coming out from air conditioned hall is mixed with 150 m^3/min of fresh air at 35°C DBT and 45% relative humidity. Find (i) enthalpy (ii) specific humidity (iii) specific volume (iv) DPT of the mixture.

UNIT - IV

8. a) Two geometrically similar pumps are running at the same speed of 1000 r.p.m. One pump has an impeller diameter of 300 mm and lifts water at the rate of 0.02 m^3/s against a head of 15 m. Determine the head and impeller diameter of the other pump to deliver half the discharge.

    b) Explain various head, losses and efficiencies of a pump.

(OR)

9. Explain about 'rotary compressor' ? What are the limitations of a centrifugal compressor operation ?