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10EME14/24

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017

Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
2. Use of steam table is permitted.

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) Heating of dry steam above saturation temperature is known as
A) enthalpy B) latent heat C) super heating D) super tempering

ii) One kg of steam sample contains 0.8 kg dry steam its dryness fraction is
A) 0.2 B) 0.8 C) 1.0 D) 0.6

iii) The water tubes in a Babcock and Wilcox boiler are
A) horizontal B) vertical C) inclined D) none of these

iv) The condition of steam in boiler drum is always
A) dry B) wet C) super heated D) none of these

b. A vessel having a volume of 0.6 m^3 contains 3.0 kg of liquid water and water vapour mixture in equilibrium at a pressure of 0.5 MPa. Calculate:
i) Mass and volume of liquid
ii) Mass and volume of vapour **(06 Marks)**

c. Explain with a neat sketch, the method of power generation from wind energy. **(06 Marks)**

d. Write the functions of any four types of boiler mountings. **(04 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) The impulse reaction turbine has its driving force
A) as impulsive force
B) as a reaction force
C) partly as an impulsive force and partly as reaction force
D) none of the above

ii) The steam leaves the nozzle at a
A) high pressure and a low velocity B) high pressure and a high velocity
C) low pressure and a low velocity D) low pressure and a high velocity

iii) Parson turbine is a
A) simple impulse turbine B) simple reaction turbine
C) impulse reaction turbine D) none of these

iv) Compounding of steam turbine involves
A) reduction of blade speed B) increase of blade speed
C) uniform blade speed D) none of these

b. Give the description of a simple impulse turbine with the help of a neat sketch. **(08 Marks)**

c. List the advantages of closed cycle gas turbine over open cycle gas turbine. **(04 Marks)**

d. How water turbines are classified? **(04 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) Number of working strokes per min for a four stroke cycle engine are _____ the speed of the engine in r.p.m.
A) equal to B) one-half C) twice D) four times

ii) The power actually developed by the engine cylinder of an I.C. engine is known as
A) theoretical power B) actual power
C) indicated power D) none of these

iii) A carburetor is used to supply
A) petrol, air and lubricating oil B) air and diesel
C) petrol and lubricating oil D) petrol and air

iv) The thermal efficiency of petrol engine as compared to diesel engine is
A) lower B) higher
C) same for same power output D) same for same speed

b. The following results refer to a test on a petrol engine: Indicated power = 30 kW, brake power = 26 kW, engine speed = 1000 rpm, fuel per brake power hr = 0.35 kg, calorific value of the fuel used = 43900 kJ/kg. Calculate: i) The indicated thermal efficiency; ii) The brake thermal efficiency, and iii) The mechanical efficiency **(06 Marks)**

c. Explain the working of spark ignition of four stroke engine. **(06 Marks)**

d. Explain the following terms as applied to I.C. engines: i) stroke, ii) T.D.C, iii) Swept volume, iv) Compression ratio. **(04 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) During a refrigeration cycle, heat is rejected by the refrigerant in a
A) compressor B) condenser C) evaporator D) expansion valve

ii) Which of the following refrigerant has the highest freezing point
A) ammonia B) carbondioxide C) sulphur dioxide D) R-12

iii) One tone of refrigeration means that heat removing capacity is
A) 21 kJ/min B) 210 kJ/min C) 420 kJ/min D) 620 kJ/min

iv) Air conditioning means
A) cooling B) heating C) dehumidifying D) all of these

b. State the desirable properties of a good refrigerant. **(04 Marks)**

c. Explain the working of a vapour absorption refrigerator with a neat diagram. **(08 Marks)**

d. What are the fields of application of air conditioning? **(04 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The tailstock set over required to turn a taper on the entire length of a work piece having diameters D and d is
A) $\frac{D-d}{2L}$ B) $\frac{D-d}{L}$ C) $\frac{D-d}{2}$ D) D – d

ii) Lathe bed is made of
A) mild steel B) alloy steel C) pig iron D) chilled cast iron

iii) The main purpose of a boring operation as compared to drilling is to
A) drill a hole B) finish the drilled hole
C) correct the hole D) Enlarge the existing hole

iv) The operation of smoothing and squaring the surface around a hole is known as
A) counter sinking B) counter boring C) trepanning D) spot facing

b. Explain the taper turning by swiveling the compound rest method on a lathe. **(08 Marks)**

c. Name the different operations that can be performed on a lathe. **(02 Marks)**

d. Describe with a neat sketch the working of radial drilling machine. **(06 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) The process of removing metal by a cutter which is rotated in the same direction of travel of work piece is called
A) up milling B) down milling C) face milling D) end milling

ii) The cutting tool in a milling machine is mounted on
A) spindle B) arbor C) column D) knee

iii) The method of grinding used to produce a straight or tapered surface on a workpiece is
A) internal cylindrical grinding B) form grinding
C) external cylindrical grinding D) surface grinding

iv) The method of centreless grinding used to produce taper is
A) in feed grinding B) through feed grinding
C) end feed grinding D) any of these

b. Draw a neat sketch of horizontal milling machine and explain its working. **(06 Marks)**

c. Explain: i) slot milling, ii) straddle milling, iii) form milling. **(06 Marks)**

d. Explain briefly the centerless grinder with a neat sketch. **(04 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) A soft solder is a mixture of
A) lead and tin B) copper and zin C) nickel and silver D) none of these

ii) A journal bearing is one in which the bearing pressure is
A) perpendicular to the axis of shaft B) parallel to the axis of the shaft
C) inclined to the axis of shaft D) none of these

iii) The lowest temperature at which the lubricating oil will pour
A) fire point B) flash point C) burning point D) pour point

iv) The method of lubrication used for I.C. engines is
A) wick feed B) screw cap C) drip D) splash

b. Explain the arc welding process with a neat sketch. **(07 Marks)**

c. What are the different types of lubricants? Give example. **(03 Marks)**

d. What are advantages and disadvantages of rolling contact bearings? **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) In cross belt drives, the power is transmitted between pulleys rotating in
A) same direction B) opposite direction C) either of these D) none of these

ii) _____ are used when the distance between the shaft centres is large and no slip is required
A) belts and ropes B) gears C) chains D) clutches

iii) Number of teeth on a wheel per unit of its pitch diameter is called
A) module B) diametral pitch C) circular pitch D) none of these

iv) The gear wheel or pinion used for transmitting motion between two parallel shafts is called
A) spur gear B) bevel gear C) worm gear D) none of these

b. Obtain an expression for the velocity ratio of belt drives. **(06 Marks)**

c. Explain with a neat sketch the working principle of idler pulley. **(04 Marks)**

d. What do you understand by gear train? Discuss the various types of gear trains. **(06 Marks)**

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