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10EME14/24

First/Second Semester B.E. Degree Examination, January 2013
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. ***Answer all objective type questions only on OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***
4. ***Use of steam tables is not permitted.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

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

i) Hydro energy is considered as _____,
A) Tidal energy B) Heat energy C) Indirect solar energy D) Ocean energy

ii) The primary processes of solar energy are:
A) Heliochemical process B) Helioelectrical process C) Heliothermal process D) All of these

iii) Lanchashire boiler is a _____boiler,
A) Water tube B) Fire tube C) Gas tube D) Air tube

iv) The temperature at which water starts to boil in static pressure is _____,
A) Sensible heat B) Saturation temperature C) Wet steam temperature D) Dry steam temperature

b. Find the total enthalpy of 0.6 kg of steam with an initial dryness fraction of 0.7 is heated at constant pressure of 7 bar till its temperature rises to 250°C. Assume C_{PS} = 2.25 KJ/kgK. From steam table, at 7 bar, h_f = 679.1 KJ/kg, h_{fg} = 2064.9 KJ/kg, T_{sat} = 165°C. **(06 Marks)**

c. Explain with a neat sketch, the working principle of a Lanchashire boiler. **(10 Marks)**

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

i) It is an example of reaction turbine.
A) De-Laval turbine B) Kaplan turbine C) Flow turbine D) Pelton wheel

ii) Open cycle gas turbine uses _____ as the working substance,
A) Ammonia B) Nitrogen C) Air D) CO_2

iii) _____ is example for reaction water turbine,
A) Pelton wheel B) Francis turbine C) Kaplan turbine D) Both B and C

iv) Method of improving efficiency by successive stages in a turbine is _____,
A) Governing B) Compounding C) Supercharging D) Turbocharging

b. With a neat sketch explain the working of a open cycle gas turbine. **(08 Marks)**

c. Sketch and explain the working of reaction steam turbine with the help of pressure and velocity profile diagram. **(08 Marks)**

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

i) The motion of a piston is_____,
A) Rotory B) Oscillatory C) Rectilinear D) Circular

ii) Diesel engine is also called as _____,
A) 4-stroke engine B) 2-stroke engine C) C.I. engine D) S.I.engine

iii) The power measured in the crankshaft of engine is _____,
A) Indicated power B) Brake power C) Horse Power D) Torque

iv) _____ is fed into the diesel engine through inlet valve,
A) Fuel B) Diesel C) Air fuel mixture D) Air

b. With the help of a line diagram, explain the working of a two-stroke petrol engine. **(08 Marks)**

c. A 4-cylinder two-stroke petrol engine develops 30 kW at 2500 rpm. The mean effective pressure on each piston is 8 bar and mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder, stroke to bore ratio 1.5. Also calculate the specific fuel consumption if brake thermal efficiency is 28%. The calorific value of fuel is 43900 KJ/kg. **(08 Marks)**

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

i) _____ is the heart of the refrigerator,
A) Compressor B) Condenser C) Expansion valve D) Evaporator

ii) The ratio of heat absorbed in a system to work supplied is _____,
A) Refrigeration effect B) COP C) Ton of refrigeration D) Coding effect

iii) In a refrigerator exchange of heat takes place in _____,
A) Condenser B) Evaporator C) Compressor D) Both A and B.

iv) _____ is the refrigerant used in vapour compression refrigerator
A) Ammonia B) Air C) Freon-22 D) Nitrogen

4 b. Explain with a neat sketch the working of vapour compression refrigerator. (08 Marks)

c. With a neat sketch explain the working of a typical room air conditioner. (08 Marks)

PART – B

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

i) _____ object are produced in a engine lathe.
A) Plane objects B) Curved objects C) Circular objects D) None of these

ii) Taper turning is an operation of producing _____ on the work piece.
A) Tapping B) Reaming C) Taper D) Boring

iii) Flute in a twist drill is used for,
A) Flow of Coolant B) Removal of material C) Easy removal of curl chips D) All of these

iv) _____ is not a drilling operation,
A) Taper turning B) Reaming C) Knurling D) Turning

b. Explain with a schematic diagram, show how a centre lathe is specified. (08 Marks)

c. How are counter sinking and counter boring operation done on a drilling machine? Explain with suitable sketches. (08 Marks)

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

i) Milling cutter is a _____,
A) Multipoint cutting tool B) Abrasive cutter C) Single point cutting tool D) Metal removing machine

ii) Milling is a _____,
A) Metal removal process B) Metal cutting processor C) Metal joint process D) None of these

iii) _____ is a natural abrasive mineral consists of aluminium oxide.
A) Diamond B) Corundum C) Emery D) Aluminium Nitrate

iv) Grinding is also called as _____
A) Turning B) Metal cutting C) Abrasive machining D) Lapping

b. Sketch and explain the principle and working of a horizontal milling machine. (08 Marks)

c. With a neat sketch, explain the surface grinding machine. (08 Marks)

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

i) Welding is a _____ process used for metals,
A) Metallurgical joining B) Forged forming C) Mechanical joining D) Adhesive bonding

ii) Gas welding is a _____ method of joining two metals.
A) Fission B) Fusion C) Gas reaction D) Oxidizing

iii) Lubricants are used to reduce the _____ in machines.
A) Efficiency B) Effectiveness C) Friction D) Torque

iv) In thrust bearing the bearing pressure will be _____,
A) Radial B) Circular C) Axial D) Centrifugal

b. With a neat sketch, explain the working of oxy-acetylene gas welding. (08 Marks)

c. List the important properties of good lubricant. (08 Marks)

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

i) The _____ motion is the simplest form of transmitting power with minimum losses.
A) Rotational B) Rectilinear C) Oscillatory D) None of these

ii) _____ is also called as positive drive mechanisms.
A) Belt drive B) Chain drive C) Gear drive D) Both B and C.

iii) _____ type of gear drive is used for transmitting power between two perpendicular shafts.
A) Bevel gear B) Elliptical gear C) Helical gears D) Spur gear

iv) For high power transmission _____ is most suitable power transmission.
A) Belt drive B) V-belt drive C) Rope drive D) Gear drives

b. Derive an expression for the length of the belt in an open drive system. (08 Marks)

c. Two spur gears A and B connect two parallel shafts that are 500 mm apart. Gear A runs at 400 rpm and gear B at 200 rpm. If the circular pitch is 30 mm. Calculate the number of teeth on gears A and B. (08 Marks)

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