USN | | | | | | | | | |

06EME14/24

First/Second Semester B.E. Degree Examination, December 2010
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 in OMR sheet page 5 of the Answer Booklet.
3.Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

1 a. Choose the correct answer :

i) Photosynthesis process which is the source of all fossil fuels and food is called_____.
A) Helio electrical process B) Helio chemical process
C) Helio thermal process D) None of these.

ii) The difference between superheated temperature and the saturation temperature is defined as
A) Sensible heat B) Latent heat
C) Amount of superheat D) Degree of superheat.

iii) _____ is an accessory of a boiler.
A) Pressure gauge B) Safety valve
C) Economizer D) Feed check valve.

iv) Example of a water tube boiler is
A) Babcock and Wilcox boiler B) Lancashire boiler
C) Cornish boiler D) Cochran boiler. **(04 Marks)**

b. 5kg of wet steam of dryness fraction 0.8, passes from a boiler to a superheater, at a constant pressure of 10 bar abs. In the superheater its temperature increases to 350°C. Determine its amount of heat supplied in the superheater. The specific heat of superheated steam $C_{ps} = 2.25$ kJ/kg K.

[At P = 10 bar abs, the properties from steam tables are :
$T_s = 179.88°C$ $h_f = 762.61$ kJ/kg $h_{fg} = 2013.6$ kJ/kg. **(06 Marks)**

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

2 a. Choose the correct answer :

i) _____ turbine is an example for steam turbine.
A) Kaplan turbine B) Pelton wheel
C) Francis turbine D) Parson's turbine.

ii) Impulse steam turbines have _____ type of blades.
A) Symmetrical profile B) Aerofoil profile
C) Unsymmetrical profile D) None of these.

iii) In Pelton wheel _____ energy is converted into mechanical energy.
A) Electrical B) Solar
C) Hydraulic D) Wind

iv) _____ is an example for reaction turbine.
A) Kaplan turbine B) Pelton wheel
C) De Lavel turbine D) Curtis turbine. **(04 Marks)**

b. Explain with neat sketches, the working principles of impulse and reaction turbines. **(10 Marks)**

c. What is compounding of a steam turbine? Briefly explain the velocity compounding of a steam turbine. **(06 Marks)**

3 a. Choose the correct answer :

i) A petrol engine works on ____ thermodynamic cycle.
A) Otto cycle B) Diesel cycle
C) Dual combustion cycle D) Sterling cycle.

ii) In 4-stroke engines, number of rotations of the crankshaft to complete a cycle are
A) 1 B) 2
C) 4 D) 6

iii) The part of the engine, which stores energy during power stroke and supply the same for the other three strokes is
A) Piston B) Crank
C) Connecting rod D) Flywheel.

iv) In diesel engines, heat is supplied at constant
A) Temperature B) Pressure
C) Volume D) Area. **(04 Marks)**

b. With a neat sketch, explain the working principle of a four stroke diesel engine, with the PV diagram. **(10 Marks)**

c. A single cylinder four stroke engine runs at 1000 rpm has a bore of 115 mm and has a stroke of 140 mm. The brake load is 6 kg at 600 mm radius and the mechanical efficiency is 80%. Calculate brake power and the mean effective pressure. **(06 Marks)**

4 a. Choose the correct answer :

i) Which one of the following is not used as a refrigerant?
A) Freon – 22 B) Hydrogen
C) Ammonia D) Sulphur dioxide.

ii) In a refrigeration system, the ratio of heat absorbed in a system to the work supplied is called_____
A) Efficiency B) Effectiveness
C) Coefficient of performance D) None of these.

iii) In a vapour absorption refrigerator, the absorber contains,
A) Ammonia B) Cold water
C) Carbon dioxide D) Methyl chloride.

iv) Presence of moisture in a refrigeration cycle will show its effect at
A) Compressor suction B) Compressor discharge
C) Expansion valve D) Condenser. **(04 Marks)**

b. What are the properties of a good refrigerant? Explain. **(06 Marks)**

c. Explain with a neat sketch, the working of a vapour compression refrigerator. **(10 Marks)**

PART – B

5 a. Choose the correct answer :

i) Carriage is a part of a
A) Milling machine B) Drilling machine
C) Grinding machine D) Lathe.

ii) Enlarging of a drilled hole, using a single point cutting tool in a drilling machine, is called _____
A) Drilling B) Counter boring
C) Boring D) Tapping.

iii) The machining operation performed on a lathe, to obtain a flat surface, at the end of the work piece is called
A) Turning B) Facing
C) Knurling D) Taper turning.

iv) Tapping operation is performed to obtain
A) External threads B) Internal threads
C) Tapered hole D) Cylindrical hole. **(04 Marks)**

b. With a neat sketch, explan the following machining operations :
   i) Counter boring
   ii) Knurling
   iii) Taper turning (09 Marks)

c. With a neat sketch, explain the construction and working of a radial drilling machine. (07 Marks)

6 a. Choose the correct answer :

i) Regulating wheel is used in _____ operation.
   A) Surface grinding B) Centre type cylindrical grinding
   C) Centreless ginding D) None of these.

ii) Which one is not an abrasive particle?
   A) Aluminum oxide B) Diamond
   C) Corundum D) Silicate.

iii) Knee is a part of a
   A) Horizontal milling machine B) Lathe
   C) Radial arm drilling machine D) None of these.

iv) The process of milling used to mill slots, pockets and keyways, in such a way, that, the axis of the milling cutter is perpendicular to the surface of the workpiece is called___
   A) Straddle milling B) Angular milling
   C) End milling D) Gang milling. (04 Marks)

b. Explain the following milling operations, with a neat sketch :
   i) Gang milling
   ii) Straddle milling
   iii) Form milling. (09 Marks)

c. With a neat sketch, explain the external cylindrical centerless grinding process. (07 Marks)

7 a. Choose the correct answer :

i) The oxy – acetylene flame, which contains more amount of oxygen and less amount of acetylene is
   A) Neutral flame B) Reducing flame
   C) Oxidizing flame D) None of these.

ii) Joining of two thin metal pieces using an alloy by the application of heat is called
   A) Soldering B) Welding
   C) Brazing D) Buffing.

iii) The lubrication method, used in I.C. engines to lubricate the cylinder and the piston is
   A) Splash lubrication B) Drop feed lubrication
   C) Syphon wick lubrication D) None of these.

iv) Ball bearings are also called as
   A) Thrust bearings B) Journal bearings
   C) Antifriction bearings D) None of these. (04 Marks)

b. What are the desirable properties of a good lubricant? Explain any six. (06 Marks)

c. With a neat sketch, explain the working principle of oxy – acetylene gas welding. (06 Marks)

d. List any four differences between soldering and brazing. (04 Marks)

8d

8 a. Choose the correct answer :

i) Power transmitted is
   A) The rate of work done per unit time
   B) The product of force and distance traveled
   C) The energy emitted by any machine or engine
   D) None of these.

ii) Open belt drive is employed when
   A) Two parallel shafts are rotating in the some direction
   B) Two parallel shafts are rotating in the opposite direction
   C) Two perpendicular shafts are rotating in the same direction
   D) Two perpendicular shafts are rotating in the opposite direction.

iii) Gears, used for connecting non – parallel and non intersecting axes shafts are
   A) Spur gears B) Bevel gears
   C) Worm gears D) Spiral gears.

iv) Gear drive used to convert the rotary motion into linear motion is
   A) Spur gear B) Bevel gear
   C) Rack and pinion D) Spiral gear. **(04 Marks)**

b. With neat sketches, explain the following terms, used in belt drives :
   i) Arc of contact
   ii) Tight and slack sides
   iii) Velocity ratio. **(09 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 30mm, calculate the number of teeth on gears A and B. **(07 Marks)**

* * * * *