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First/Second Semester B.E. Degree Examination, December 2011
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 your correct answer for the following :
- Capacity to do work is called
 A) Heat B) Energy C) Temperature D) Power
 - The conversion of solar energy directly into electrical energy is known as
 A) Helio electrical process B) Mechanical process
 C) Helio thermal process D) None of these
 - An adiabatic process occurs at constant
 A) Temperature B) Pressure
 C) Heat D) Volume
 - Lancashire boiler is an example of _____ boiler
 A) Fire tube B) Water tube C) Air tube D) None of these
 (04 Marks)
- b. Define, work, energy and power. What are the units (SI)?
 (06 Marks)
- c. 1 kg of superhead steam at 1.5 MPa contains 3000 kJ of heat energy. Find the superheated temperature. It 500 kJ of heat energy is removed at the same pressure, what is the condition of the steam? Use following data $P = 1.5 \text{ MPa} = 15 \text{ bar}$, $T_s = 198.29^\circ\text{C}$, $h_f = 844.6 \text{ kJ/kg}$, $h_{fg} = 1,945.2 \text{ kJ/kg}$, $h_g = 2,789.9 \text{ kJ/kg}$.
 (10 Marks)
- 2 a. Choose your correct answer for the following :
- A prime mover in which the heat energy of the gas is transformed into mechanical energy directly in the form of rotary motion is called
 A) Steam turbine B) Gas turbine
 C) Water turbine D) None of these
 - Pelton wheel is a _____ turbine.
 A) Low head B) Impulse
 C) Reaction D) None of these
 - Example for impulse turbine is
 A) De Laval B) Kaplan
 C) Reaction turbine D) None of these
 - Kaplan turbine is a _____ turbine
 A) Impulse B) Low discharge C) Mixed D) Reaction
 (04 Marks)
- b. Briefly explain the difference between a steam turbine, gas turbine and water turbines.
 (08 Marks)
- c. Define compounding and explain types of compounding of steam turbines.
 (08 Marks)

- 3 a. Choose your correct answer for the following :
- Internal combustion engine is more popularly known as
 - E.C. engine
 - Heat engine
 - I.C. engine
 - None of the above
 - In a 4- stroke engine, the number of rotations of the crankshaft to complete a cycle.
 - 2
 - 4
 - 6
 - 1
 - The crankshaft rotates in only one direction in a
 - 2 – stroke engine
 - 4 –stroke engine
 - 6 – stroke engine
 - None of the above
 - In diesel engines heat is supplied at
 - Constant volume
 - Constant temperature
 - Constant area
 - Constant pressure
- (04 Marks)
- b. Compare a petrol engine with a diesel engine (08 Marks)
- c. Find the indicated power of a 4 stroke petrol engine. The average piston speed is 70 m/min. The mean effective pressure is 5.5 bar. The diameter of the piston is 150 mm. (08 Marks)
- 4 a. Choose your correct answer for the following :
- An _____ serves as a device, to reduce the pressure and the temperature of the liquid refrigerant, before it passes to the evaporator.
 - Condenser
 - Radiator
 - Expansion valve
 - Refrigerant
 - C.O.P. refrigeration is given by _____ with usual notations.
 - $\frac{W}{Q}$
 - $\frac{Q}{W}$
 - $\frac{T_1}{T_2}$
 - None of these
 - One ton of refrigeration is equal to _____ watts.
 - 1,500
 - 2,500
 - 3,500
 - 4,500
 - Which part of the refrigerator is known as the heart of the refrigerator?
 - Evaporator
 - Condenser
 - Pump
 - Expansion valve
- (04 Marks)
- b. Briefly explain a refrigerant, a refrigerator, refrigeration and air – conditioning. (08 Marks)
- c. Explain, with a neat sketch, the working of a vapour compression refrigerator. (08 Marks)

PART – B

- 5 a. Choose your correct answer for the following :
- i) A _____ is a machine tool employed generally to produce circular objects.

A) Lathe	B) Engine
C) Turbine	D) Generator
 - ii) The tool which makes the hole is called a _____.

A) Workpiece	B) Arbor
C) Drill	D) Spanner
 - iii) _____ is the process of generating internal threads

A) Knurling	B) Milling
C) Turning	D) Tapping
 - iv) Grip to hold jobs firmly is done by means of a process called

A) Plane turning	B) Knurling
C) Taper turning	D) Grinding
- (04 Marks)
- b. Define a machine tool. What are the functions of a lathe? (08 Marks)
- c. Sketch and explain the radial drilling machine. (08 Marks)
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- 6 a. Choose your correct answer for the following :
- i) When the workpiece is fed in the opposite direction to the cutter tooth at the point of contact, the process is called
 - A) Down milling
 - B) Up milling
 - C) Cross milling
 - D) None of the above
 - ii) When the workpiece is fed in the same direction as that of the cutter tooth at the point of contact, the process is called
 - A) Conventional
 - B) Climb
 - C) Non – conventional
 - D) None of the above
 - iii) The horizontal shaft used to mount the milling cutter is called
 - A) Spindle
 - B) Saddle
 - C) Connecting rod
 - D) Arbor
 - iv) Grinding is also called
 - A) Abrasive machining
 - B) Twisting
 - C) Honning
 - D) Lapping
- (04 Marks)
- b. What is the difference between milling, drilling and turning? (09 Marks)
- c. Explain various milling operations. (07 Marks)

- 7 a. Choose your correct answer for the following :
- Metal fabrication involves joining of minimum _____ metals together
 A) One
 B) Two
 C) Three
 D) None of these
 - In _____ welding the parts to be joined are heated only upto the plastic state and then fused together by applying the external pressure
 A) Temperature
 B) Volume
 C) Pressure
 D) None of these
 - Fusion welding is also known as
 A) Pressure welding
 B) Thermit welding
 C) Resistance welding
 D) Non – pressure welding
 - _____ is the measure of internal friction of lubricating oil.
 A) Viscosity
 B) Porosity
 C) Electricity
 D) All of these
- (04 Marks)
- b. Distinguish amongst soldering, brazing and arc welding processes with simple diagrams.
 (09 Marks)
- c. Compare sliding contact and rolling contact bearings.
 (07 Marks)

- 8 a. Choose your correct answer for the following :
- Ratio of a belt drive is defined as the ratio of
 A) Speed of the driving pulley to the speed of the driven pulley.
 B) Speed of the driven pulley to the speed of the driving pulley.
 C) Speed of the fast pulley to the speed of the loose pulley.
 D) None of the above.
 - In an open belt drive, to increase the arc of contact of the belt and driven pulley _____ is used.
 A) Cross belt
 B) Stepped cone pulley
 C) Jockey pulley
 D) Fast and loose pulley
 - _____ drive is called a positive drive
 A) Rope
 B) Belt
 C) Chain
 D) Gear
 - _____ gears are used to connect only two non – parallel, non – intersecting shafts
 A) Bevel
 B) Helical
 C) Spur gear
 D) Spiral
- (04 Marks)
- b. Derive an expression for the ratio of tensions of a belt drive.
 (08 Marks)
- c. In an open belt drive running in the clockwise direction, the tension in the tight side is 3000 N and the arc of contact is 150° . If the coefficient of friction is 0.3, find the tension on the slack side.
 (08 Marks)

OR

- c. A gear wheel of 20 teeth drives another gear wheel having 36 teeth drive, running at 200 rpm. Find the speed of the driving wheel and the velocity ratio.
 (08 Marks)

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