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First/Second Semester B.E. Degree Examination, June/July 2011
Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer 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.
 4. Use of steam tables is not permitted.

PART - A

- 1 a. Choose the correct answer:
- The steam heated beyond its dry saturated stage is called _____.
 A) Dry steam B) Wet steam C) Saturated steam D) Super heated steam
 - Sensible heat is also called as _____.
 A) Enthalpy of saturated water B) Enthalpy of evaporation
 C) Enthalpy of dry saturated steam D) Enthalpy of super heated steam.
 - Economiser is a device used to _____.
 A) heat the air fed to the furnace
 B) increase the temperature of steam above the saturation temperature
 C) heat the feed water
 D) separate the water particles present in the steam.
 - Lancashire boiler is of _____.
 A) fire tube type B) stationary type C) horizontal type D) All of these (04 Marks)
- b. With a neat sketch, explain the functioning of Ocean Thermal Energy Conversion (OTEC). (06 Marks)
- c. Find the enthalpy of heat in 2 kg of steam at 0.9 bar and 85% quality. Use the properties of steam given below. (06 Marks)

Saturation pressure (bar)	Saturation temperature (°C)	Specific enthalpy of saturated liquid (kJ/kg)	Specific enthalpy of saturated vapour (kJ/kg)
0.9	96.71	405.21	2670.9

- d. Differentiate between:
- Boiler mountings and accessories
 - Dry saturated steam and super heated steam. (04 Marks)

- 2 a. Choose the correct answer:
- In case of impulse steam turbine there is _____.
 A) pressure drop in fixed and moving blades
 B) pressure drop only in moving blades
 C) pressure drop only in nozzles
 D) pressure drop only is fixed blades
 - Curtis turbine is _____.
 A) reaction steam turbine
 B) pressure velocity compounded steam turbine
 C) pressure compounded impulse steam turbine
 D) velocity compounded impulse steam turbine

- iii) Mechanical efficiency of a gas turbine plant as compared to IC engine is
 A) higher B) lower C) same D) unpredictable.
- iv) Pelton turbine is a
 A) reaction turbine B) gas turbine
 C) tangential flow turbine D) mixed flow turbine (04 Marks)
- b. With a neat sketch, explain the working of a Pelton wheel. (06 Marks)
- c. Explain with a neat sketch, the working of Curtis and Moore impulse turbine. (06 Marks)
- d. What are the advantages of gas turbines over IC engines? (04 Marks)
- 3 a. Choose the correct answer:
- i) The combustion of fuel in petrol engine takes place at
 A) constant pressure B) constant volume
 C) constant temperature D) none of these.
- ii) In a four stroke engine, the number of rotations of the crank shaft to complete a working cycle is
 A) 1 B) 2 C) 3 D) 4
- iii) In CI engine, during the suction stroke _____ is sucked in to the cylinder.
 A) diesel B) diesel and air mixture
 C) diesel and petrol mixture D) air.
- iv) Scavenging is employed in _____
 A) 4-stroke petrol engine B) 2-stroke petrol engine
 C) 4-stroke diesel engine D) None of these. (04 Marks)
- b. The following observations were recorded during a test on 4-stroke diesel engine:
 Bore = 200mm ; Stroke = 250mm ; Mean effective pressure = 0.6 MPa
 Brake drum diameter = 1.2m; Net brake load = 500N ; Speed of crank shaft = 600 rpm
 Find, i) Indicated power ii) Brake power iii) Friction power iv) Mechanical efficiency. (10 Marks)
- c. Name the thermodynamic cycle of petrol engine. Draw the PV diagram of the same indicating various processes. (06 Marks)
- 4 a. Choose the correct answer:
- i) _____ converts vapour refrigerant into liquid refrigerant.
 A) Compressor B) Evaporator C) Condenser D) Motor.
- ii) Throttle valve is used in a refrigerator to _____
 A) compress the refrigerant B) expand the refrigerant
 C) absorb the heat from the refrigerant D) condense the refrigerant
- iii) Which of the following is not a desirable property of a refrigerant?
 A) High latent heat of vaporization B) High freezing point
 C) Low viscosity D) Low specific volume
- iv) The purpose of air conditioning is to
 A) control temperature B) control humidity
 C) clean and purify air D) all the above. (04 Marks)
- b. With a neat sketch, explain the working of room air conditioner. (10 Marks)
- c. Explain vapour absorption refrigeration system with a neat sketch. (06 Marks)

PART - B

- 5 a. Choose the correct answer:
- _____ is not a part of carriage assembly.
A) Apron B) Compound slide C) Tool post D) Tail stock
 - _____ is the operation of separating a piece of finished work from the bar stock.
A) Parting B) Facing C) Turning D) Knurling
 - _____ is the process of enlarging the previously drilled hole.
A) Reaming B) Boring C) Tapping D) Spot facing
 - _____ is the process of generating internal threads.
A) Reaming B) Boring C) Tapping D) Drilling. (04 Marks)
- b. Sketch and explain the following operations of a drilling machine:
- Boring ii) Counter sinking iii) Tapping iv) Spot facing (12 Marks)
- c. List the specifications of a lathe. (04 Marks)
- 6 a. Choose the correct answer:
- In _____ process the direction of rotation of cutter and the direction of feed of the workpiece are opposite to each other.
A) Conventional milling B) Down milling
C) Climb milling D) None of these.
 - Milling cutter in horizontal milling machine is held in _____.
A) Over arm B) Column C) Arbor D) Knee
 - _____ is not an abrasive material used in grinding wheels.
A) Emery B) Aluminium oxide C) Corundum D) Graphite
 - In _____ grinding the workpiece is held over a work rest in between two grinding wheels.
A) cylindrical centre B) centreless cylindrical
C) surface grinding D) None of these (04 Marks)
- b. Draw a schematic sketch of horizontal milling machine and briefly explain the functions of its main parts. (10 Marks)
- c. Sketch and explain centreless grinding. (06 Marks)
- 7 a. Choose the correct answer:
- The metal used to make the brush is _____.
A) Mild steel B) Gun metal C) Cast iron D) Copper
 - Wick lubrication works on the principle of _____.
A) gravity flow B) forced flow C) siphon D) free flow
 - Spelter is used in
A) soldering B) brazing
C) resistance welding D) arc welding
 - Graphite is used as
A) filler material B) flux C) spelter D) lubricant. (04 Marks)
- b. What are the differences between soldering and brazing? (05 Marks)
- c. Explain with a neat sketch splash lubrication. Where is it used? (05 Marks)
- d. What are the advantages and disadvantages of sliding contact bearings? (06 Marks)

8 a. Choose the correct answer:

- i) _____ belts are acid and water proof.
 A) Leather B) Balata C) Textile D) Canvas
- ii) _____ arrangement enables a machine to be started or stopped at will, without stopping the belt run.
 A) Friction cones B) Compound belt drive
 C) Fast and loose pulley D) Jockey pulley.
- iii) In simple gear train, if the number of idler gears is odd, then the direction of rotation of driven gear will
 A) be opposite to that of the driving gear
 B) depends on the number of teeth on the driving gear
 C) depends on the speed of driving gear
 D) be same as that of the driving gear.
- iv) Mitre gear is a type of
 A) Spur gear B) Helical gear C) Bevel gear D) Worm gear (04 Marks)

b. Derive an expression for length of belt in cross belt drive. (08 Marks)

c. In an open belt drive arrangement, the speed of driver and driven pulley are 1000 rpm and 750 rpm respectively. If the diameter of driver pulley is 600 mm, determine the diameter of driven pulley

- i) without considering the thickness of belt and slip
 ii) by considering the thickness of belt, assuming the thickness of belt as 10 mm.
 iii) by considering both thickness of belt and slip, assuming the thickness of belt as 10 mm and overall slip as 5%. (08 Marks)
