

**First/Second Semester B.E. Degree Examination, June 2012**  
**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.**

**PART – A**

- 1 a. Choose your answers for the following : (04 Marks)**
- The condition of steam in boiler drum is always  
 A) Dry B) Wet  
 C) Saturated D) Superheated
  - In which case, the potential energy is converted into the mechanical energy  
 A) Hydel energy B) Solar energy  
 C) Wind energy D) Nuclear energy
  - 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
  - If x is the weight of dry steam and y is the weight of water suspension, then dryness fraction is equal to  
 A)  $\frac{x}{x+y}$  B)  $\frac{y}{x+y}$   
 C)  $\frac{x}{x-y}$  D)  $\frac{y}{x-y}$
- b. Sketch and explain the working of Babcock and Wilcox boiler. (10 Marks)**
- c. Determine the specific volume and density of 1 kg steam at a pressure of  $7 \times 10^5$  Pa, when the condition of steam is i) Wet, having dryness fraction 0.9 ii) Dry iii) Superheated at 250°C. If required use the extract of the steam table provided below :**

P	$t_s$	$V_g$
7 bar	437.92 K	0.27334 m <sup>3</sup> /kg

(06 Marks)

- 2 a. Choose your answers for the following : (04 Marks)**
- The propelling force in a steam turbine depends on the \_\_\_\_\_ action of the turbine  
 A) Dynamic B) Static  
 C) Both D) None
  - Francis turbine is a \_\_\_\_\_ turbine  
 A) Impulse B) Reaction  
 C) Both D) None
  - An example for tangential flow turbine is  
 A) Pelton wheel B) Kaplan Turbine  
 C) Thomson turbine D) Modern Francis Turbine
  - Delaval turbine is also called  
 A) Impulse steam turbine B) Gas turbine  
 C) Reaction turbine D) Water turbine
- b. What is compounding? With a suitable diagram, explain the velocity compounding. (10 Marks)**
- c. Distinguish between impulse and reaction turbine. (06 Marks)**

**(04 Marks)**

- 3**
- a. Choose your answers for the following : **(04 Marks)**
- i) In IC engines, the connecting rod connects \_\_\_\_\_ and \_\_\_\_\_
    - A) Piston and crank shaft
    - B) Inlet and outlet valves
    - C) Piston and piston rings
    - D) None
  - ii) The combustion of fuel in petrol engine takes place at
    - A) Constant pressure
    - B) Constant volume
    - C) Constant temperature
    - D) None of these
  - iii) The process of breaking up of a liquid into fine droplets by spraying is called
    - A) Vaporisation
    - B) Carburetion
    - C) Ionization
    - D) Atomisation
  - iv) A diesel engine is
    - A) Spark ignition engine
    - B) Compression ignition engine
    - C) External combustion engine
    - D) none of these
- b. With the help of line diagram, explain the working of a four stroke petrol engine. **(08 Marks)**
- c. The following observations were recorded during a test on 4-stroke diesel engine :
- Bore = 200 mm, Stroke = 250 mm, Mean effective pressure = 0.6 MPa,  
Brake drum diameter = 1.2 m. Net brake load = 500 N, Speed of crank shaft = 600 rpm.
- Find :
- i) Indicated power
  - ii) Brake power
  - iii) Friction power
  - iv) Mechanical efficiency.
- (08 Marks)**

- 4 a. Choose your answers for the following : (04 Marks)
- i) In \_\_\_\_\_ of the refrigerator, liquid refrigerant is evaporated by absorption of heat from the refrigerator cabinet in which substances are kept that have to be cooled
- A) Compressor B) Condenser  
C) Evaporator D) Expansion valve
- ii) Throttle valve is used in a refrigerator to \_\_\_\_\_
- A) Compress refrigerant B) Expand the refrigerant  
C) Absorb the heat from the refrigerant D) Condense the refrigerant
- iii) In SI unit one ton of refrigeration is equal to
- A) 210 kJ/ min B) 21 kJ/ min  
C) 420 kJ/ min D) 105 kJ/ min
- iv) A refrigerant should have
- A) Low viscosity B) Low freezing point  
C) Low boiling point D) All the above
- b. What is the principle of refrigeration? Name the essential parts of a refrigerator and briefly explain their functions. (08 Marks)
- c. With a neat sketch, explain the working of room air conditioner. (08 Marks)

## PART – B

- 5** a. Choose your answers for the following : **(04 Marks)**
- i) The slowest speed in lathe is adopted for following operation  
A) Turning B) Thread cutting  
C) Taper turning D) Knurling
- ii) \_\_\_\_\_ is the operation of Separating a piece of finished work from the bar stock  
A) Parting B) Boring  
C) Facing D) Turning
- iii) During machining operation on the lathe, the tools are placed on  
A) Saddle B) Cross slide  
C) Compound rest D) Tool post
- iv) \_\_\_\_\_ is the process of generating internal threads  
A) Reaming B) Boring  
C) Tapping D) Drilling
- b. Sketch a radial drilling machine and explain its working. **(08 Marks)**
- c. With the help of a sketch, indicate the specifications of a lathe. **(08 Marks)**

- 6 a. Choose your answers for the following : (04 Marks)**
- The cutting tool in a milling machine is mounted on  
A) Tool holder B) Arbor  
C) Column D) Table
  - Removal of material by mechanical action of abrasive particles is called as  
A) Slot milling B) Grinding  
C) Reaming D) Tapping
  - In \_\_\_\_\_ grinding, the work piece is held over a work rest in between two grinding wheels.  
A) Cylindrical centre B) Centreless cylindrical  
C) Surface grinding D) None of these
  - Chip thickness in \_\_\_\_\_ milling is minimum at the beginning of cut and reaches to the maximum when the cut ends.  
A) Up B) Down  
C) Both D) None
- b. Sketch and explain centreless grinding. (08 Marks)**
- c. Draw the neat sketch of horizontal milling machine and explain parts. (08 Marks)**
- 7 a. Choose your answers for the following : (04 Marks)**
- The hard filler material used in brazing is  
A) Solder B) Flux  
C) Spelter D) Electrode
  - Solder is essentially a  
A) Tin silver base B) tin lead base  
C) Silver lead base D) bismuth lead base.
  - Resistance of lubricating oil to flow is  
A) Porosity B) Electricity  
C) Viscosity D) None
  - Support provided for rotating shaft is  
A) Bearings B) Lubricant  
C) Axle D) Pedestal
- b. Explain briefly the metal joining processes of soldering, brazing and welding. (09 Marks)**
- c. Briefly discuss the three types of flames used in gas welding and mention their applications. (07 Marks)**
- 8 a. Choose your answers for the following : (04 Marks)**
- \_\_\_\_\_ belts are acid and water proof  
A) Leather B) Balata  
C) Textile D) Canvas
  - The ratio of pitch circle diameter to number of teeth is  
A) Pitch B) Circular pitch  
C) Module D) Addendum
  - The surface of the gear tooth below the pitch surface is called  
A) bottom tooth B) Face  
C) Flank D) Tooth depth
  - Mitre is a type of  
A) Spur gear B) Helical gear  
C) Bevel gear D) Worm gear
- b. Derive an equation for ratio of tension in belt drive. (08 Marks)**
- c. Write the different types of gear trains with their application. (08 Marks)**