

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 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 permitted.

PART - A

- 1 a. Select the correct answer : (04 Marks)
- The process in which using the principle of photo voltaic effect, the steam energy is directly converted into electrical energy is
 - Helio electrical process
 - Helio thermal process
 - Mechanical process
 - None of these
 - The difference between superheated temperature and the saturation temperature of steam is called
 - Degree of superheat
 - Latent heat vapourization
 - Sensible heat
 - None of these
 - Quality of wet steam is decided by its
 - Temperature
 - Pressure
 - Dryness fraction
 - None of these
 - Specific volume of superheated steam (V_{sup}) with usual notations is

$$A) = V_g \times \frac{T_{sat}}{T_{sup}} \quad B) = V_g \times \frac{T_{sup}}{T_{sat}} \quad C) = V_f \times \frac{T_{sat}}{T_{sup}} \quad D) = V_f \times \frac{T_{sup}}{T_{sat}}$$
- b. Differentiate between renewable and non-renewable sources of energy. (06 Marks)
- c. 10Kg of wet steam of dryness fraction 0.8, passes from a boiler to superheater at a constant pressure of 1MPa. In the superheater its temperature increases to 340°C. Determine the amount of heat supplied in the superheater. Assume specific heat of superheated steam $C_p = 2.25 \text{KJ/Kg}^\circ\text{K}$. (10 Marks)
- 2 a. Select the correct answer : (04 Marks)
- Utilization of the high pressure energy of the steam by expanding it in successive stages is called.
 - Impulse turbine
 - Reaction turbine
 - Compounding
 - None of these
 - Pelton wheel is a
 - Law head impulse turbine
 - Medium head impulse turbine
 - High head impulse turbine
 - Reaction turbine
 - In case of impulse water turbine, the entire hydro energy is converted into kinetic energy by passing the water through
 - Tailrace
 - Runner
 - Nozzle
 - None of these
 - The cross-section of a draft tube in a turbine
 - Is uniform
 - Gradually decreases towards the outlet
 - Gradually increases towards the outlet
 - None of these
- b. Explain the working principle of operation of impulse and reaction turbines. (06 Marks)
- c. Sketch and explain the working of a pelton wheel. (10 Marks)

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.

- 3 a. Select the correct answer : (04 Marks)
- In a four stroke C.I. engine, during suction stroke :

A) Only air is sucked in	B) Only diesel is sucked in
C) Both air and diesel sucked in	D) Either diesel or air is sucked in
 - In two stroke engines, the number of revolutions made by the crank to complete one cycle is

A) One	B) Two	C) Three	D) Four
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 - The brakepower of an engine is always the indicated power

A) Equal to	B) Less than	C) Greater than	D) Reciprocal of
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 - The inner diameter of engine cylinder is called as

A) Stroke	B) Clearance	C) Bore	D) Pitch
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- b. With neat sketches, explain the working of 2-stroke petrol engine. (08 Marks)
- c. A single cylinder 4-stroke I.C. engine has bore of 180mm, stroke of 200mm and a rated speed of 300rpm. Torque on the brakedrum is 200N-m and mean effective pressure is 6 bar. It consumes 4kg of fuel per hour. The calorificvalue of fuel is 42000KJ/Kg. Determine B.P, I.P, Brake thermal efficiency and mechanical efficiency. (08 Marks)

- 4 a. Select the correct answer : (04 Marks)
- An ideal refrigerant should have

A) Low specific heat	B) Low viscosity
C) High thermal conductivity	D) All of these
 - The principle of refrigeration is based on

A) Law of conservation of energy	B) I law of thermodynamics
C) II law of thermodynamics	D) Zeroth law of thermodynamics
 - The ratio of heat extracted from the refrigerator to the work done is called

A) Performance ratio	B) Thermal efficiency
C) Co-efficient of performance	D) Performance index
 - The most commonly used refrigerant in vapour absorption refrigeration system is

A) Freon	B) CO ₂	C) SO ₂	D) NH ₃
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- b. Explain Vapour Absorption refrigeration system. (08 Marks)
- c. Explain room air conditioner system. (08 Marks)

PART - B

- 5 a. Select the correct answer : (04 Marks)
- The process of thread cutting on a drilling machine is called as

A) Spot facing	B) Reaming	C) Tapping	D) Boring
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 - The operation of finishing the inner surface of a drilled hole is called as

A) Spot facing	B) Reaming	C) Tapping	D) Boring
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 - To drill a hole on a lathe, a drill bit is held in the

A) Toolpost	B) Tailstock spindle	C) Head stock	D) Compound rest
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 - Which of these drilling machines is used for mass production?

A) Bench drilling machine	B) Radial drilling machine
C) Gang drilling machine	D) Portable drilling machine
- b. Draw a neat sketch of a lathe and label its parts. (10 Marks)
- c. Differentiate between counter sinking and counter boring. (06 Marks)

- 6 a. Select the correct answer : (04 Marks)
- Irregular shape of machining is done in
A) Angular milling B) Form milling C) Gang milling D) End milling
 - is a type of artificial abrasive.
A) Sand stone B) Corundum C) Emery D) Aluminium oxide
 - In vitrified bonding process, the abrasive grains are mixed with
A) Clay and water B) Silicate of soda C) Shellac D) Rubber
 - The horizontal shaft used to mount the milling cutter is called
A) Spindle B) Connecting rod C) Saddle D) Arbor
- b. Draw a neat sketch of column and knee type horizontal milling machine and explain its working. (10 Marks)
- c. Sketch and explain the following operations (06 Marks)
- Surface grinding
 - Cylindrical grinding
- 7 a. Select the correct answer : (04 Marks)
- Fusion welding is also known as.....
A) Pressure welding B) Resistance welding
C) Non-pressure welding D) Thermit welding
 - The filler material used in brazing is
A) Solder B) Flux C) Spelter D) Electrode
 - As the oil temperature increases, its viscosity
A) Increases B) Decreases
C) Will remain constant D) None of these
 - A bearing in which the load acts along the axis of the shaft is called as
A) Thrust bearing B) Journal bearing C) Roller bearing D) Ball bearing
- b. What are the desirable properties of a good lubricant? (06 Marks)
- c. Distinguish between soldering, brazing and welding. (10 Marks)
- 8 a. Select the correct answer : (04 Marks)
- The pulley which is used to increase the arc of contact is
A) Stepped pulley B) Speed cone
C) Jockey pulley D) Fast and loose pulley
 - The ratio of speeds of the driver and driven pulley is
A) Ratio of tensions B) Module
C) Pitch circle diameter D) Velocity ratio
 - The gear used to connect coplanar, parallel and Non-parallel axes shaft is
A) Helical gear B) Spur gear C) Bevel gear D) Worm gear
 - To convert rotary motion into linear motion which of the following gear is used?
A) Spur gear B) Bevel gear C) Rack and pinion D) None of these
- b. Define slip and creep with respect to belt drives. (06 Marks)
- c. Mention the advantages and disadvantages of belt drive. (06 Marks)
- d. A compound gear train is formed by 4 gears P, Q, R and S. Gear P meshes gear Q and R meshes gear S. Gear Q and R are compounded. P is connected to the driving shaft and S is connected to the driven shaft and power is transmitted, the details of the gears are given below. Find speed of gear P. if gear S rotates at 60rpm (04 Marks)
- | Gears | P | Q | R | S |
|-------------|----|----|----|----|
| No of teeth | 30 | 60 | 40 | 80 |
