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10EME14/24

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)**

i) The process in which using the principle of photo voltaic effect, the steam energy is directly converted into electrical energy is
A) Helio electrical process B) Helio thermal process
C) Mechanical process D) None of these

ii) The difference between superheated temperature and the saturation temperature of steam is called
A) Degree of superheat B) Latent heat vapourization
C) Sensible heat D) None of these

iii) Quality of wet steam is decided by its
A) Temperature B) Pressure C) Dryness fraction D) None of these

iv) Specific volume of superheated steam (Vsup) with usual notations is

A) $= V_g X \frac{T_{sat}}{T_{sup}}$ B) $= V_g X \frac{T_{sup}}{T_{sat}}$ C) $= V_f X \frac{T_{sat}}{T_{sup}}$ D) $= V_f X \frac{T_{sup}}{T_{sat}}$

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 Cp = 2.25KJ/Kg°K. **(10 Marks)**

2 a. Select the correct answer : **(04 Marks)**

i) Utilization of the high pressure energy of the steam by expanding it in successive stages is called.
A) Impulse turbine B) Reaction turbine C) Compounding D) None of these

ii) Pelton wheel is a
A) Law head impulse turbine B) Medium head impulse turbine
C) High head impulse turbine D) Reaction turbine

iii) In case of impulse water turbine, the entire hydro energy is converted into kinetic energy by passing the water through
A) Tailrace B) Runner C) Nozzle D) None of these

iv) The cross–section of a draft tube in a turbine
A) Is uniform B) Gradually decreases towards the outlet
C) Gradually increases towards the outlet D) 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)**

3 a. Select the correct answer : **(04 Marks)**

i) 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

ii) 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

iii) The brakepower of an engine is always ..... the indicated power
A) Equal to B) Less than C) Greater than D) Reciprocal of

iv) The inner diameter of engine cylinder is called as
A) Stroke B) Clearance C) Bore D) Pitch

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)**

i) An ideal refrigerant should have
A) Low specific heat B) Low viscosity
C) High thermal conductivity D) All of these

ii) 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

iii) 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

iv) The most commonly used refrigerant in vapour absorption refrigeration system is
A) Freon B) CO_2 C) SO_2 D) NH_3

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)**

i) The process of thread cutting on a drilling machine is called as
A) Spot facing B) Reaming C) Tapping D) Boring

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

iii) 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

iv) 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)**

i) Irregular shape of machining is done in

A) Angular milling B) Form milling C) Gang milling D) End milling

ii) ..... is a type of artificial abrasive.

A) Sand stone B) Corundum C) Emery D)Aluminium oxide

iii) In vitrified bonding process, the abrasive grains are mixed with

A) Clay and water B) Silicate of soda C) Shellac D) Rubber

iv) 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)**

i) Surface grinding ii) Cylindrical grinding

7 a. Select the correct answer : **(04 Marks)**

i) Fusion welding is also known as.....

A) Pressure welding B) Resistance welding

C) Non-pressure welding D) Thermit welding

ii) The filler material used in brazing is .....

A) Solder B) Flux C) Spelter D) Electrode

iii) As the oil temperature increases, its viscosity .....

A) Increases B) Decreases

C) Will remain constant D) None of these

iv) 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)**

i) 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

ii) The ratio of speeds of the driver and driven pulley is

A) Ratio of tensions B) Module

C) Pitch circle diameter D) Velocity ratio

iii) 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

iv) To convert rotary motion into linear motion which of the following gear is used?

A) Spur gear B) Bevel gear C) Rackand 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

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