Elements of Mechanical Engineering VTU CBCS Question Paper Set 2018

CBCS Scheme

USN | | | | | | | | | | |

17EME14

First Semester B.E. Degree Examination, Dec.2017/Jan.2018
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Write the differences between Renewable and Non-Renewable energy resources. **(06 Marks)**
b. Explain liquid flat plate collector with neat sketch. **(06 Marks)**
c. Explain principle of Nuclear power plant with neat sketch. **(08 Marks)**

OR

2 a. Explain the formation of steam with T-H diagram. **(08 Marks)**
b. Explain the construction and working of "Lancashire Boiler". **(08 Marks)**
c. What are boiler mountings and accessories? List examples of each. **(04 Marks)**

Module-2

3 a. Explain the De Laval turbine with neat sketch and Pressure-Velocity diagram. **(06 Marks)**
b. Explain the open cycle gas turbine with block diagram. **(06 Marks)**
c. The following observations were made during a trial run on a four stroke diesel engine:
Cylinder diameter = 25 cm
Stroke of the piston = 40 cm
Crank shaft speed = 250 rpm
Brake load = 70 kg
Brake drum diameter = 2 m
Mean effective pressure = 6 Bar
Diesel oil consumption = 0.1 litre/min
Specific gravity of diesel = 0.78
Calorific value of diesel = 43900 kJ/kg
Find : (i) Brake power (ii) Indicated power (iii) Friction power (iv) Mechanical efficiency (v) Brake thermal efficiency (vi) Indicated thermal efficiency. **(08 Marks)**

OR

4 a. Explain construction and working of Four stroke SI engine with neat sketch and P-V diagram. **(08 Marks)**
b. Explain the working of Pelton wheel with neat sketch. **(08 Marks)**
c. Define : (i) Steam turbine (ii) Internal combustion engine. **(04 Marks)**

Module-3

5 a. Explain the taper turning by swivelling compound tool rest. **(06 Marks)**
b. List the various operations performed on drilling machine. Explain with the neat sketches Boring and counterboring operations. **(10 Marks)**
c. What is milling? Differentiate drilling and milling operation. **(04 Marks)**

OR

6 a. Define automation and explain the flexible automation. **(06 Marks)**

b. Define Robot and write the classification of robot based on physical configuration. Explain the Cartesian co-ordinate robot with neat sketch. **(08 Marks)**

c. With the block diagram, explain the basic elements of NC automation system. **(06 Marks)**

Module-4

7 a. Write a note on ferrous alloys (any two). **(08 Marks)**

b. Define composite material. Mention its applications in aerospace and automation industries. **(06 Marks)**

c. Briefly explain types of non-ferrous alloys (any two). **(06 Marks)**

OR

8 a. Explain with neat sketch the arc welding method. **(08 Marks)**

b. List the different types of Oxy-acetylene flames and state their applications. **(06 Marks)**

c. Define : welding, brazing and soldering. **(06 Marks)**

Module-5

9 a. List out the desirable properties of an good refrigerant. **(06 Marks)**

b. Explain the principle and working of vapour compression refrigeration with neat sketch. **(08 Marks)**

c. Define the following : (i) Refrigeration (ii) Air conditioning (iii) Refrigerant **(06 Marks)**

OR

10 a. Explain with a neat sketch, working of room air conditioner. **(08 Marks)**

b. What are the differences between vapour compression and absorption systems? **(08 Marks)**

c. List out refrigerants commonly used in practice. **(04 Marks)**

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15EME14/24

First/Second Semester B.E. Degree Examination, June/July 2016
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the working of a hydroelectric power plant with a neat sketch. **(10 Marks)**

b. Distinguish between renewable and non-renewable sources of energy with suitable examples. **(06 Marks)**

OR

2 a. With a neat sketch, explain the working of a water tube boiler. Show the path of flue gases. **(10 Marks)**

b. Draw a neat sketch of temperature-Enthalpy diagram and indicate the following on it: Latent heat of evaporation, Amount of super heat, Sensible heat, Degree of superheat, Saturation temperature. **(06 Marks)**

Module-2

3 a. Discuss the advantages of steam turbines over other prime movers. **(10 Marks)**

b. Draw a neat sketch of a simple impulse water turbine indicating the parts. Explain its working. **(06 Marks)**

OR

4 a. Explain the working of a four stroke petrol engine with neat sketches. **(10 Marks)**

b. A 4-cylinder two stroke engine develops 30 kW at 2500 rpm. Calculate the diameter and stroke of each cylinder if the stroke to bore ratio is 1.5. The mean effective pressure on each piston is 6 bar and its mechanical efficiency is 80%. **(06 Marks)**

Module-3

5 a. Explain the process of taper turning by swiveling of the compound rest with a neat sketch. **(10 Marks)**

b. Differentiate between:
(i) Drilling and reaming.
(ii) Boring and counter boring. **(06 Marks)**

OR

6 a. Explain the Cartesian co-ordinate configuration and spherical co-ordinate configuration of robots with neat sketches. **(10 Marks)**

b. Mention the advantages and limitations of automation. **(06 Marks)**

Module-4

7 a. Define composite materials. How are composites classified? **(10 Marks)**

b. Mention the applications of composite materials in aerospace and automotive industries. **(06 Marks)**

OR

8 a. Explain the principle of arc welding with a neat sketch. **(10 Marks)**

b. List the different types of oxyacetylene flames and state their applications. **(06 Marks)**

Module-5

9 a. Explain the working principle of a vapour compression refrigeration system with a neat sketch. **(10 Marks)**

b. List the desirable properties of a refrigerant. **(06 Marks)**

OR

10 a. With a neat sketch, explain the working of a room air conditioner. **(10 Marks)**

b. Distinguish between refrigeration and air conditioning. **(06 Marks)**

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15EME14/24

First/Second Semester B.E. Degree Examination, June/July 2017

Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain petroleum based solid, liquid and gaseous fuels. **(08 Marks)**

b. Explain with a neat sketch the principle and operation of a typical windmill. **(08 Marks)**

OR

2 a. Explain with a neat sketch a Lancashire boiler. **(08 Marks)**

b. Define internal energy of steam and explain with reference to a T-H diagram formation of steam. **(08 Marks)**

Module-2

3 a. With a neat sketch, explain a Parason's reaction turbine. **(08 Marks)**

b. Explain with a neat sketch, principle and working of a pelton turbine. **(08 Marks)**

OR

4 a. Explain a 4-stroke C.I. engine with neat sketch and PV diagram. **(08 Marks)**

b. During a trial on single cylinder 4-stroke petrol engine the following readings were recorded:
Brake torque = 640 N-m
Cylinder diameter = 210 mm
Speed of the engine = 350 rpm
Length of stroke = 280 mm
Mean effective pressure = 6.5 bar
Consumption of petrol = 8.16 kg/hr
Calorific value of fuel = 42.7 MJ/kg
Determine:
i) Mechanical efficiency
ii) Indicated thermal efficiency
iii) Brake thermal efficiency
iv) Brake specific fuel consumption **(08 Marks)**

Module-3

5 a. What is turning? Explain with a neat sketch the taper turning by swiveling compound rest method. **(08 Marks)**

b. Explain with sketches the following machining operations:
i) End milling
ii) Slot milling **(08 Marks)**

OR

6 a. Explain the cylindrical coordinate configuration and spherical coordinate configuration of robots with neat sketches. **(08 Marks)**

b. What is automation? Explain fixed automation and programmable automation. **(08 Marks)**

Module-4

7 a. Explain in brief ferrous metals and alloys. **(08 Marks)**

b. What is composite material? Discuss its applications in aircrafts and automobiles. **(08 Marks)**

OR

8 a. Define soldering, brazing and welding. Also differentiate between soldering and brazing. **(08 Marks)**

b. Explain in brief an arc welding process with a neat sketch. **(08 Marks)**

Module-5

9 a. List out the properties of good refrigerant. **(08 Marks)**

b. Define the following (any four):

i) Refrigeration
ii) Refrigerant
iii) C.O.P. of a refrigerator
iv) Relative C.O.P.
v) Ton of refrigeration
vi) Ice making capacity
vii) Refrigerator
viii) Air conditioning **(08 Marks)**

OR

10 a. Explain the principle and working of vapour absorption refrigeration with a neat sketch. **(08 Marks)**

b. Explain with a sketch working of a room air-conditioner. **(08 Marks)**

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15EME14

First Semester B.E. Degree Examination, Dec.2015/Jan.2016
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define solar constant and explain liquid flat plate collector with a neat sketch. **(08 Marks)**

b. Explain principle of nuclear power plant with a neat sketch. **(08 Marks)**

OR

2 a. Define enthalpy and explain formation of steam with a T-S diagram. **(08 Marks)**

b. Explain Babcock and Wilcox boiler with a neat sketch. **(08 Marks)**

Module-2

3 a. Define Turbine & explain De Laval turbines with a neat sketch and P-V diagram. **(08 Marks)**

b. Explain closed cycle gas turbine with a neat sketch. **(08 Marks)**

OR

4 a. Explain 4-stroke SI engine with a neat sketch and PV diagram. **(08 Marks)**

b. Define indicated power and brake power. A four stroke IC engine running at 450 rpm has a bore diameter of 100 mm and stroke length 120 mm. The indicator diagram details are : Area of the diagram 4 cm^2, length of the indicator diagram 6.5 cm and the spring value of the spring used is 10 bar/cm. Calculate indicated power of the engine. **(08 Marks)**

Module-3

5 a. Explain with neat sketches,
i) Plain milling
ii) End milling.
iii) Slot milling. **(08 Marks)**

b. Explain the following machining operations on lathe machine with suitable sketches:
i) Turning.
ii) Thread cutting.
iii) Knurling
iv) Facing **(08 Marks)**

OR

6 a. Write classification of robot configurations and explain Cartesian coordinate with a suitable sketch. **(08 Marks)**

b. Define automation and explain flexible and fixed automation. **(08 Marks)**

Module-4

7 a. Write classification of ferrous and non-ferrous metals and explain briefly. **(08 Marks)**

b. Write a short note on composites. **(08 Marks)**

OR

8 a. Define soldering and explain electric arc welding with a suitable sketch. **(08 Marks)**

b. Explain oxy-acetylene welding process with a sketch. **(08 Marks)**

Module-5

9 a. Define the following:

i) Ton of refrigeration.

ii) Refrigerating effect.

iii) Ice making capacity

iv) COP **(08 Marks)**

b. Explain principle and working of vapour compression refrigeration with a sketch. **(08 Marks)**

OR

10 a. Explain with a sketch working of room air conditioner. **(08 Marks)**

b. List out properties of a good refrigerant and explain any two. **(08 Marks)**

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15EME14/24

First/Second Semester B.E. Degree Examination, Dec.2016/Jan.2017
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define renewable and non-renewable energy resources and differentiate them. **(06 Marks)**

b. With the help of T–H diagram, explain the generation of steam at constant pressure. **(10 Marks)**

OR

2 a Define : i) Dryness fraction ii) Sensible heat iii) Latent heat iv) Enthalpy of steam. **(04 Marks)**

b. Draw a neat diagram and explain the construction and working of "Liquid flat plate collector" used for water heating applications. **(12 Marks)**

Module-2

3 a. What is steam turbine? Show the classifications of steam turbine. **(06 Marks)**

b. With a neat sketch, explain the working of Franci's turbine. **(10 Marks)**

OR

4 a. With the help of 'P–V' diagram, explain the operation of 4–S petrol engine. **(08 Marks)**

b. Following data are collected from a 4–S single cylinder engine at full load.
Bore = 200mm ; stroke = 280mm ; speed = 300rpm. Indicated mean effective pressure = 5.6 bar, Torque on the brake drum = 250N-m, fuel consumed = 4.2kg/hour, and calorific value of fuel = 41,000kJ/kg.
Determine :
i) Mechanical efficiency
ii) Indicated thermal efficiency, and
iii) Brake thermal efficiency. **(08 Marks)**

Module-3

5 a. With simple sketches, explain the following lathe operations :
i) Facing ii) Cylindrical turning. **(06 Marks)**

b. Define automation. Discuss the types of automation along with their merits and demerits. **(10 Marks)**

OR

6 a. Show the differences between drilling and boring. **(04 Marks)**

b. Define robot. State the different types of robot configurations. **(04 Marks)**

c. Draw a neat diagram to show the robot arm movement in Cartesian configuration and explain. **(08 Marks)**

Module-4

7 a. State the characteristics and applications of : i) Aluminium and its alloys ii) Copper and its alloys. **(08 Marks)**

b. Differentiate between soldering and brazing. **(04 Marks)**

c. State the advantages and disadvantages of welding over other types of joining processes. **(04 Marks)**

OR

8 a. List the advantages and limitations of composites. **(08 Marks)**

b. With a neat diagram, explain the Oxy-acetylene welding process. **(08 Marks)**

Module-5

9 a. Define refrigeration. State the applications of refrigeration. **(04 Marks)**

b. Define the following refrigeration terms :
i) Refrigerant ii) ton of refrigeration iii) COP iv) relative COP. **(04 Marks)**

c. With the help of a flow diagram, explain the functioning of "Vapour compression refrigeration cycle". **(08 Marks)**

OR

10 a. What is refrigerant? State the desired properties of refrigerant. **(06 Marks)**

b. Draw a neat diagram of a room air conditioner and explain. **(10 Marks)**

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Element of Mechanical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Differentiate between conventional and Non conventional energy sources. **(04 Marks)**
b. Define Higher calorific value (HCV) and lower calorific value (LCV) of a fuel. **(04 Marks)**
c. Explain with a neat sketch working of a wind mill. **(08 Marks)**

OR

2 a. Explain the terms:
i) Dry saturated steam
ii) Wet steam
iii) Superheated steam **(04 Marks)**
iv) Degree of superheat. **(04 Marks)**
b. Define Boiler mountings and Boiler Accessories. **(08 Marks)**
c. Explain with a sketch working of Babcock and Wilcox Boiler.

Module-2

3 a. Differentiate between working of open cycle and closed cycle Gas turbine. **(04 Marks)**
b. How are IC engines classified? **(04 Marks)**
c. Explain with a sketch working by simple impulse steam Turbine (De Laval Turbine). **(08 Marks)**

OR

4 a. Explain with a Pv diagram working of a four stroke Diesel engine. **(08 Marks)**
b. A fair stroke diesel engine has a piston diameter of 250mm and stroke of 400mm. Mean effective pressure is 4Bar, Speed is 500 Rpm. Diameter of the Brake drum is 1m and effective Brake load is 400N. Determine Indicated power, Brake power and Frictional power. **(08 Marks)**

Module-3

5 a. Explain with sketch following operations on Lathe
i) Knurling **(06 Marks)**
ii) Thread cutting. **(06 Marks)**
b. Sketch and explain cylindrical co-ordinate Robot. **(04 Marks)**
c. With a simple Block diagram, explain the element of NC machine.

OR

6 a. Explain with sketch the following operations a Drilling Machine
i) Counter Boring **(06 Marks)**
ii) Countersinking. **(06 Marks)**
b. Explain with a sketch Polar configuration Robot. **(04 Marks)**
c. What are the objectives of Automation?

Module-4

7 a. Explain the composites properties and Application of cast Iron **(04 Marks)**

b. How are composites classified. **(04 Marks)**

Explain with a sketch working of electric Arc welding. **(08 Marks)**

OR

8 a. What are the applications of composites in Automobile and Aerospace Industry? **(04 Marks)**

b. Differentiate between soldering, Brazing, Welding. **(04 Marks)**

c. Explain the process of

i) Soldering

ii) Brazing. **(08 Marks)**

Module-5

9 a. Define :

i) Refrigeration

ii) Air conditioning

b. List the commonly used Refrigerants. **(04 Marks)**

c. Explain with a sketch working of vapour absorption Refrigerating system. **(04 Marks)** **(08 Marks)**

OR

10 a. Differentiate between working of Vapour compression and vapour absorption Refrigerating system. **(04 Marks)**

b. Define the terms :

i) Refrigerant

ii) Refrigerating effect

iii) COP

iv) ICE making capacity. **(04 Marks)**

c. Explain with sketch working of window Air conditioner. **(08 Marks)**

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