Unit – IV

7. a) With a sketch explain the operation of taper turning by swiveling the compound rest in an engine lathe
   b) With sketches explain (i) cylindrical grinding (ii) surface grinding
   c) Differentiate between
      (i) Facing and knurling
      (ii) Drilling and boring

8. a) Draw the neat sketch of a radial drilling machine and label the parts.
   b) With neat sketches differentiate between upmilling and down millig
   c) Differentiate between lapping and honing.

Unit – V

9. a) Derive an expression to find the length of the belt in terms of the radii and center distance between the pulleys for an open belt system
   b) Two parallel shafts are to be connected by a gear drive. They are 1 meter apart and their velocity ratio is to be exactly 9:2. If the pitch of the gears is 57 mm, find the number of teeth in each of the two wheels and the distance between the shafts.
   c) Name the three types of oxy acetylene flames. Explain the application of each one of them

10. a) A driven pulley of 400 mm diameter of a belt drive runs at 400 rpm. The angle of lap is 165° and the coefficient of friction between the belt material and pulley is 0.25. Find the power transmitted if the initial tension is not to exceed 10 kN.
    b) How the gears can be classified? With relevant sketches explain spur, bevel and worm gears.
    c) Distinguish between soldering and brazing

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester B.E. (Mechanical) (Credit System) Degree Examinations

May - 2014

13ME104 - ELEMENTS OF MECHANICAL ENGINEERING

Time: 3 Hours. Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

1. a) What are conventional and non conventional sources of energy? List the advantages and disadvantages. 06
   b) Draw the neat diagram of babcock and Wilcox boilerand label the parts. Also indicate the path of flue gases and water circuit. 08
   c) With an example explain closed loop control system. Give its advantages over open loop system. 06

2. a) Define and explain the following
   (i) dryness fraction (ii) Enthalpy of super-heated steam (iii) Degree of super heat (iv) Internal energy 08
   b) Calculate the internal energy of 10 kg of steam at a pressure of 10 bar if
   (i) It is dry saturated
   (ii) Its dryness fraction is 0.9
   (iii) Its temperature is 240°C assuming C_p is 2330J/kgK

   At 10 bar pressure, 08
   T_s=180°C, Vg = 0.194 m^3, h_f = 762.6 kJ/kg, h_{fg}= 2015 kJ/kg
   c) Differentiate between boiler accessories and boiler mountings. Give two examples in each case. 04

Unit – II

3. a) With the help of pressure –velocity diagram explain the working of a reaction steam turbine 08
   b) With relevant sketches explain the working of two stroke IC engine operating with constant volume cycle. 08
   c) Differentiate between open loop and closed loop gas turbine cycles. 04

4. a) With a neat sketch explain the construction and working of pelton wheel. 08
   b) A four stroke petrol engine of 100 mm bore and 150 mm stroke consumes 1 kg of fuel per hour. The mean effective pressure is 7 bar and indicated thermal efficiency is 30%. Calorific value of the fuel is 40 MJ/kg. Find the crankshaft speed. 08
   c) Explain the differences between impulse and reaction water turbines. 04

Unit – III

5. a) With a neat sketch explain the construction and working of a diffuser type of centrifugal pump. 08
   b) Draw the neat diagram of vapor absorption refrigeration system and explain its working. 08
   c) With a neat sketch explain splash lubrication system with mentioning its applications. 04

6. a) With a neat diagram explain the construction and working of reciprocating type air compressor. 08
   b) With relevant diagrams explain ball and roller bearings. Also compare them with sliding contact bearings. 08
   c) State and explain the thermodynamic properties of a good refrigerant. 04

P.T.O.

13ME104

6. a) Explain wick lubricator with sketch.
   b) Describe with sketch working of Ball and Roller bearing.
   c) Define : i) COP ii) Refrigeration effect iii) TOR

Unit – IV

7. a) Draw block diagram of an engine lathe and label its parts.
   b) Explain with sketch the following drilling machine operations:
      i) Counter Boring
      ii) Counter Sinking
      iii) Boring
      iv) Reaming

8. a) Describe with sketch column and knee type milling machine.
   b) Explain cylindrical grinding with sketch.
   c) Explain plain milling and angular milling operations.

Unit – V

9. a) Differentiate between open and cross belt drive.
   b) A shaft running at 100 rpm is to drive a parallel shaft at 150 rpm. The pulley on the driving shaft is 35cm in diameter. Find the diameter of the driven pulley. Calculate the linear velocity of the belt and also the velocity ratio.
   c) Explain arc welding process with a neat sketch.

10. a) Explain simple and compound gear train with neat sketch.
    b) A compound gear train consists of 4 gears, A, B, C and D, and they have 20, 30, 40 and 60 teeth respectively. A is keyed to the driving shaft, and D is keyed to the driven shaft, B and C are compound gears, B meshes with A, and C meshes with D. If A rotates at 180 rpm, find the rpm of D. Sketch the arrangement by simple circles.
    c) Differentiate between welding and brazing.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

First / Second Semester B.E. (Credit System) Degree Examinations

Make up / Supplementary Examinations – July 2014

13ME104 – ELEMENTS OF MECHANICAL ENGINEERING

Time: 3 Hours Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full question from each Unit.***

Unit – I

a) Explain closed loop control system used in mechatronics. 6

b) Explain the process of steam formation with different types of steam. 8

c) Two kg of dry steam at 1MPa is produced from the water at 40°C. Determine the quantity of heat supplied. The specific heat of water C_{pw}=4.18kJ/kg.

Steam table at 1Mpa:

T_s(°C)	h_f (kJ/kg)	h_{fg}(kJ/kg)	hg (kJ/kg)	v_f (m^3/kg)	v_g(m^3/kg)
179.9	762.6	2013.6	2776.2	0.001127	0.194

6

a) Differentiate between conventional and non-conventional sources of energy. 6

b) Draw neat sketch of Cochron boiler and label its parts 6

c) 5kg of wet steam of dryness 0.8 passes from a boiler to a superheater at a constant pressure of 1MPa abs. in the superheater its temperature increases to 350°C. Determine the amount of heat supplied in the superheater. The specific heat of superheated steam C_{ps}=2.25kJ/kgK.

Steam table at 1Mpa:

T_s(°C)	h_f (kJ/kg)	h_{fg}(kJ/kg)	hg (kJ/kg)	v_f (m^3/kg)	v_g(m^3/kg)
179.9	762.6	2013.6	2776.2	0.001127	0.194

8

Unit – II

a) Explain single stage impulse steam turbine with sketch. 6

b) With a neat sketch explain Francis turbine. 6

c) Explain closed cycle gas turbine with block diagram. 8

a) Explain with sketch and pv diagram, the working of a 4-S diesel engine. 10

b) The following observations were obtained during a trial on a four-stroke diesel engine.

Cylinder diameter = 25cm
Stroke of the piston = 40cm
Crankshaft speed = 250rpm
Brake load = 70kg
Brake drum diameter = 2m
Mean effective pressure = 6bar
Diesel oil consumption = 0.1m^3/min
Specific gravity of diesel = 0.78
Calorific value of diesel = 43900kJ/kg

Find:
1. Brake power 2. Indicated power 3. Frictional power 4. Mechanical efficiency
5. Brake Thermal Efficiency 6. Indicated Thermal Efficiency 10

Unit – III

a) Explain double acting air compressor with sketch. 6

b) Explain working of a vapour absorption refrigeration system 10

c) What are the properties of a good refrigerant? 4

P.T.O.

13ME104

6. a) Explain wick lubricator with sketch.
   b) Describe with sketch working of Ball and Roller bearing.
   c) Define : i) COP ii) Refrigeration effect iii) TOR

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Unit – V

9. a) Differentiate between open and cross belt drive.
   b) A shaft running at 100 rpm is to drive a parallel shaft at 150 rpm. The pulley on the driving shaft is 35cm in diameter. Find the diameter of the driven pulley. Calculate the linear velocity of the belt and also the velocity ratio.
   c) Explain arc welding process with a neat sketch.

10. a) Explain simple and compound gear train with neat sketch.
    b) A compound gear train consists of 4 gears, A, B, C and D, and they have 20, 30, 40 and 60 teeth respectively. A is keyed to the driving shaft, and D is keyed to the driven shaft, B and C are compound gears, B meshes with A, and C meshes with D. If A rotates at 180 rpm, find the rpm of D. Sketch the arrangement by simple circles.
    c) Differentiate between welding and brazing.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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First / Second Semester B.E. (Credit System) Degree Examinations

Make up / Supplementary Examinations – July 2014

13ME104 – ELEMENTS OF MECHANICAL ENGINEERING

ıration: 3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

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6

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b) Draw neat sketch of Cochron boiler and label its parts 6

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179.9	762.6	2013.6	2776.2	0.001127	0.194

8

Unit – II

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c) Explain closed cycle gas turbine with block diagram. 8

a) Explain with sketch and pv diagram, the working of a 4-S diesel engine. 10

b) The following observations were obtained during a trial on a four-stroke diesel engine.

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Crankshaft speed = 250rpm
Brake load = 70kg
Brake drum diameter = 2m
Mean effective pressure = 6bar
Diesel oil consumption = 0.1m^3/min
Specific gravity of diesel = 0.78
Calorific value of diesel = 43900kJ/kg

Find:

1. Brake power 2. Indicated power 3. Frictional power 4. Mechanical efficiency 5. Brake Thermal Efficiency 6. Indicated Thermal Efficiency 10

Unit – III

a) Explain double acting air compressor with sketch. 6

b) Explain working of a vapour absorption refrigeration system 10

c) What are the properties of a good refrigerant? 4

P.T.O.

6. a) Sketch and explain the Vapor Compression Refrigerator
   b) Sketch and explain splash lubricator
   c) With a neat sketch explain the working of centrifugal pump

Unit – IV

7. a) With a neat sketch of engine lathe illustrate its parts.
   b) Mention the types of drilling machines and demonstrate the following drilling operations:
      i. Countersinking
      ii. Boring
      iii. Counter boring

8. a) Name the different milling processes and justify with description any three operations with neat sketches.
   b) Point out the working principle of surface grinding with a sketch and mention any four commonly used abrasives along with their applications.

Unit – V

9. a) Enumerate the differences between brazing and soldering
   b) With reference to the gear drives, state the conditions when the following are employed Spur gears (ii) Helical gears (iii) Bevel gears.
   c) In an open belt drive, a motor pulley of diameter 0.5 m drives another pulley of the same diameter at 250 rpm. If the coefficient of friction in the drive is 0.12 and the initial tension limited to 10 kN, compute the tensions in the belt drive and hence the power transmitted.

10. a) With reference to an open belt drive system, deduce an expression for the belt length.
    b) What is module and circular pitch with reference to gears?
       A simple train of wheels consists of successively engaging three wheels having 40, 50, teeth respectively. Determine its velocity ratio. If the driving wheel having 40 teeth rotates at 210 rpm, compute the speed of the driven wheel.
    c) Enumerate the various areas of applicability of welding.

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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First Semester B.E. (Credit System) Degree Examinations

December - 2014

14ME104 – ELEMENTS OF MECHANICAL ENGINEERING

Duration: 3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

1. a) Compare Renewable and non-renewable sources. 5
   b) With an example explain the function of microprocessor based control system. 5
   c) With a neat sketch explain the working of a Babcock & Wilcox Boiler 10

2. a) Define i) Amount of superheat
      ii) Dryness fraction
      iii) Enthalpy of dry saturated steam 6
   b) A mixture of saturated water and saturated steam at a temperature of 250°C is contained in a closed vessel of 0.1m^3 capacity. If the mass of the saturated water is 2 kg, find the mass of the steam in the vessel. Also find the specific volume, dryness fraction and the enthalpy of the mixture. From steam tables at t_s=250°C V_f=0.0012513 m^3/kg, V_g= 0.05004 m^3/kg, hf=1085.8 kJ/kg, h_{fg}= 1714.6 kJ/kg. 8
   c) Discuss the difference between water tube and fire tube boilers. 6

Unit – II

3. a) Sketch and explain the Four-Stroke Cycle Diesel Engine. Also indicate the pressure volume variation in the engine 10
   b) List any five difference between Impulse and Reaction Steam Turbines 5
   c) With a neat sketch explain an medium head reaction water turbine 5

4. a) Explain velocity compounded Impulse turbine 6
   b) List any six difference between close and open cycle Gas turbine 6
   c) The following observations were obtained during a trial on a four stroke diesel engine.
      Cylinder diameter = 25 cm
      Stroke of the Piston = 40 cm
      Crankshaft speed = 250 rpm
      Brake load = 70 kg
      Brake drum diameter = 2 m
      Mean effective pressure = 6 bar
      Diesel oil consumption = 100 cc/min
      Specific gravity of diesel = 0.78
      Calorific Value of diesel = 43900 kJ/kg
      Find:
      a)Brake Power
      b)Indicated Power
      c)Frictional Power
      d)Mechanical Efficiency
      e)Brake Thermal Efficiency
      f)Indicated Thermal Efficiency 8

Unit – III

5. a) Sketch and explain plummer block 8
   b) Sketch and explain the Kaplan Turbine 6
   c) What are the properties of a good lubricant 6

P.T.O.

b) With reference to grinding, write a note on the following:
   i. Elastic process in bonding
   ii. Rubber process in bonding
   iii. Emery abrasive
   iv. Lapping
   v. Honing

Unit – V

9. a) A pulley is driven by a flat belt running at a speed of 600 m/min. The coefficient of fric... between the belt and the pulley rim is 0.3 and the angle of lap is 160°. Compute the po... transmitted by the belt if the maximum tension in the belt is limited to 1 kN. Also determ... the initial belt tension.
   b) With reference to welding, enumerate the advantages and limitations.
   c) What is a compound gear train? Derive an expression for the velocity ratio of a compou... gear train with a neat sketch. Also mention its advantage.

10. a) Deduce an expression to obtain the ratio of tensions in a flat belt drive.
   b) What is the principle of arc welding? Explain with a neat sketch.
   c) Two spur gears P and Q connect two parallel shafts that are 450 mm apart. Gear P runs ... double the speed of gear Q. Gear Q runs at 150 rpm in anti-clockwise direction. If ... circular pitch is given to be 20 mm, compute the number of teeth on the gears P and Q.

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