Unit – IV

7. a) Draw the neat diagram of an engine lathe and write the function of each part.
   b) Differentiate between (i) drilling and reaming (ii) countersinking and counter boring (iii) boring and counter boring
   c) With a simple sketch explain the principle of operation of cylindrical grinding machine.

8. a) Explain the parts of Radial drilling machine with neat sketch.
   b) Differentiate between Up milling and Down milling with sketch.
   c) Explain the principle of taper turning operation in lathe with necessary sketch.

Unit – V

9. a) Derive an expression for the ratio of tension in a flat belt drive.
   b) The driven pulley of 400 mm diameter of a belt drive runs at 200 rpm. The angle of lap is 165^0 and the coefficient of friction between the belt material and the pulley is 0.25. Find the power transmitted if the initial tension is not to exceed 10 kN.
   c) Differentiate between welding and soldering.

10. a) With a neat sketch define the following Gear terminology
    (i) Circular pitch (ii) Module (iii) Addendum (iv) Dedendum
    b) Two spur gears A and B connect two parallel shafts that are 500 mm apart. Gear A runs at 400 rpm and gear B at 200 rpm. If the circular pitch is given to be 30mm, calculate the number of teeth on gears A and B.
    c) Explain the principle of electric arc welding process with neat sketch.

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NMAM INSTITU[illegible] OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

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

May - June 2013

12ME104 – ELEMENTS OF MECHANICAL ENGINEERING

[illegible]ation: 3 Hours Max. Marks: 100

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

Unit – I

a) Distinguish between conventional and Non-conventional energy with example. 4

b) Sketch and explain Cochran boiler. 8

c) 5 kg of wet steam of dryness 0.8, passes from a boiler to a super heater at a constant pressure of 1MPaabs. In the super heater its temperature increases to 350° C. Determine the amount of heat supplied in the super heater. The specific heat of super heated steam Cps=2.25 kj / kg K. 8

a) Define the following terms: (i) dryness fraction (ii) Latent heat of vaporization (iii) Internal energy (iv) Enthalpy of wet steam 8

b) Explain the functions of various elements of measurement system with block diagram and give example. 8

c) Explain the functions of the following boiler mountings and accessories. 6
(i) safety valve (ii) Feed check Valve (iii) Economizer

Unit – II

a) With a neat sketch explain the working of a four stroke diesel engine using P-V diagram.

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

Cylinder diameter = 25 cm
[illegible] of the Piston = 40 cm
[illegible]ankshaft speed = 250 rpm
[illegible]rake 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: (i) Brake Power (BP) (ii) Indicated Power (IP) (iii) Frictional Power (FP) (iv) Mechanical Efficiency (v) Brake Thermal Efficiency (vi) Indicated Thermal Efficiency 10

a) Differentiate between open and closed cycle gas turbines. 4

b) With a neat sketch explain the working principle of Kaplan turbine. 8

c) With a neat sketch explain the working of a single stage impulse steam turbine. 8

Unit – III

a) Explain the working principle of a Centrifugal pump with the help of neat sketch.

b) List and explain the desired properties of a good refrigerant.

c) Explain splash lubrication system with a neat sketch.

a) Explain with a neat sketch the working of a vapour compression refrigerator. 8

b) Differentiate between sliding contact and rolling contact bearing with example. 4

c) Sketch and explain the working principle of an air compressor. 8

P.T.O.

9. a) Mention the advantages and disadvantages of belt drives. 6
   b) Derive an expression for ratio of belt tensions in a flat belt drive. 8
   c) In a belt drive, the ratio of the speed of driven pulley to that of driving pulley is 3. If the driven pulley is of diameter 300 mm, while the driving pulley runs at 400 rpm, find the speed of the driven pulley and the diameter of the driving pulley. 6

10. a) Define welding. Explain any one type of welding process with a sketch. 10
    b) Derive an expression for the velocity ratio of a compound gear train involving 4 spur gears such that the intermediate shaft carries two gears. 6
    c) Two gear wheels having 80 teeth and 30 teeth mesh with each other. If the smaller gear wheel runs at 480 rpm, find the speed of the larger wheel. 4

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MAM 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 2013

12ME104 – ELEMENTS OF MECHANICAL ENGINEERING

Duration: 3 Hours Max. Marks: 100

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

Unit – I

a) Describe open loop and closed loop control systems with block diagram and examples. 8

b) Define mechatronics and explain briefly. 4

c) List the different conventional and non-conventional energy sources. Discuss the advantages and disadvantages of renewable energy sources over non-renewable energy sources. 8

a) With a neat sketch explain the working of Babcock and Wilcox boiler. 10

b) A sample of steam is initially at 9 bar and dryness 0.98. Find its quality and temperature at each of the following cases:

(i) When steam loses 50kJ/kg at constant pressure

(ii) When steam receives 150kJ/kg at constant pressure.

Take, at 9 bar: $t_s = 175.33^0C$, $h_f = 742.5$ kJ/kg, $h_{fg} = 2209.7$ kJ/kg

Specific heat of superheated steam = 2.2 kJ/kg. 10

Unit – II

a) Differentiate between impulse and reaction turbines. 5

b) With sketch, explain the working of constant pressure closed cycle gas turbine.

c) With a neat sketch explain the working of an impulse type water turbine.

a) With sketches, explain the working of 4-stroke diesel engine. 10

b) A two-stroke diesel engine has a piston diameter of 200 mm and a stroke of 300 mm. It has a mean effective pressure of 2.8 bar and a speed of 400rpm. The diameter of the brake drum is 1m and the effective brake load is 64 kg. Find the indicated power, brake power, friction power, mechanical efficiency of the engine and the average piston speed. 10

Unit – III

a) With sketch, explain the working of centrifugal pump. 6

b) Explain the working principle of air conditioner. Mention its applications. 4

c) With a neat sketch explain the construction and working of a vapour compression refrigeration unit. 10

a) Define the terms: C.O.P., ton of refrigeration. 4

b) Give the classification of lubricants. 4

c) Explain any six properties of a good lubricant. 6

d) With a neat sketch explain the constructional features of roller bearings. 6

Unit – IV

a) What is taper turning? Explain taper turning by swivelling the compound rest. 6

b) Classify drilling machines.

c) With sketches, explain any five drilling machine operations.

a) With sketch, explain the different parts of horizontal milling machine.

b) List the common abrasive materials used in grinding.

c) Explain cylindrical grinding and surface grinding operations.

b) With neat sketches explain the following.
i) Tapping. ii) Counter Sinking. iii) Boring

c) With a neat sketch explain facing operation on a lathe

8. a) With a neat sketch explain taper turning by swiveling compound rest
b) Explain up milling and down milling with a neat sketch
c) With a neat sketch explain center less grinding

Unit – V

9. a) Derive the expression for the ratio of tensions in belt drive.
b) A leather belt transmits 20kW power from a pulley of 750mm diameter which runs at 600 rpm. The belt is in contact with the pulley over an arc of 160^0 and the coefficient of friction between the belt and the pulley is 0.3. Find the tension on each side of the open belt drive
c) With a neat sketch explain the following
i)Stepped Cone Pulley ii) Jockey Pulley

10. a) Define Welding. With a neat sketch, explain the process of Electric Arc welding
b) Differentiate between Soldering and brazing
c) A compound gear train is formed by 4 gears P,Q,R and S. Gear P meshes with gear Q and gear R meshes with gear S. gears Q and R are compounded. P is connected to driving shaft and S connected to the driven shaft and power is transmitted. If the gear S were to rotate at 100 rpm. Calculate the speed of P. represent the gear arrangement schematically. The details of the gear are given below

Gears	P	Q	R	S
No. of Teeth	30	60	40	80

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

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

December - 2013

13ME104 – ELEMENTS OF MECHANICAL ENGINEERING

ation: 3 Hours Max. Marks: 100

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

Unit – I

a) Define the terms
i) dryness fraction of steam ii) Sensible Heat iii) degree of super heat iv) specific volume 4

b) Define Renewable and Nonrenewable energy sources. Give a brief classification of energy sources. 6

c) Draw the neat sketch of Babcock and Wilcox boiler and explain its working principle. 10

a) With the block diagram, explain closed loop control system. 6

b) List any five advantages of Water Tube Boilers over Fire Tube Boilers. 5

c) Determine the conditions of steam from the following data:
a) Pressure is 10 bar absolute and temperature 190°C,
b) Pressure is 8 bar absolute and specific volume of 0.2 m^3/kg., and
c) Pressure is 12 bar absolute and enthalpy of 2500 kJ/kg.

Given that at p = 8 bar $v_g = 0.24026\ m^3 / kg$
p = 10 bar $t_s = 179.88^0\ C$
p = 12 bar $h_f = 798.4\ kJ / kg$
$h_{fg} = 1984.3\ kJ / kg$ 9

Unit – II

a) Explain the principle of reaction turbine. State any four differences between Impulse and Reaction steam turbine 8

b) With the help of a block diagram explain the working of a closed cycle gas turbine 6

c) Explain with a neat sketch, working of Pelton wheel 6

a) List any five differences between petrol and diesel engine 5

b) Explain the working of four stroke petrol engine with P-V diagram 8

c) A four cylinder, four stroke internal combustion engine develops an indicated power of 50 kW at 2500 rpm. The cylinder diameter is 75mm. and the stroke is 90 mm. Find the mean effective pressure in each cylinder. If the mechanical efficiency is 80 %, what effective brake load would be required if the effective brake drum diameter is 0.6 m. 7

Unit – III

a) Sketch and explain the Air-Conditioning system. 10

b) Sketch and explain the main components of a refrigerator. 5

c) What are the thermodynamic properties of a good refrigerant? 5

a) Explain the working principle of single stage reciprocating air compressor with the help of neat sketch. 7

b) How bearings are classified? Describe with sketch working of bushed bearing? 8

c) Sketch and explain splash lubricator. 5

Unit – IV

a) With a neat explain vertical milling machine 6

P.T.O.