

**SEMESTER END EXAMINATIONS – JANUARY 2019**

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non programmable calculator and Steam tables are allowed.

UNIT- I

1. a) Explain how Geo thermal power is harnessed with a suitable sketch. CO1 (08)
b) Define the following terms:
i) Enthalpy of wet steam
ii) Dryness fraction
iii) Saturation temperature
iv) Sensible heat.
c) Define water turbine. With a neat diagram, explain the working of impulse flow water turbine. CO1 (08)
2. a) Sketch and explain the working of a fire tube boiler. CO1 (10)
b) Define compounding of steam turbine. Explain any two methods of compounding with neat sketches. CO1 (10)

UNIT- II

3. a) Define I.C engine. How they are classified CO2 (04)
b) With suitable diagrams, explain the working of 4 stroke spark ignition engine. CO2 (10)
c) List out the properties of good refrigerants and list out the commonly used refrigerants. CO2 (06)
4. a) The following observations were recorded during a test on a 4-Stroke engine Bore = 25cm, Stroke = 40cm, crank speed = 250rpm, Net load on brake drum = 700N, Diameter of brake drum = 2 m, Indicated mean effective pressure = 6 bar. Mass of the fuel = 1.014×10^{-3} Kg/sec, Heat value of the fuel = 43.9MJ/kg. Determine (i) Brake power (ii) Indicated Power (iii) Friction Power (iv) Mechanical Efficiency (v) Indicated thermal efficiency (vi) Brake thermal efficiency. CO2 (12)
b) With a neat diagram, explain the working of window type air conditioner. CO2 (08)

UNIT- III

5. a) Draw a neat diagram of an engine lathe and label its parts. CO3 (08)
b) Explain the following operation:
i) Plain milling ii) angular milling iii) gang milling.
c) With a neat diagram explain centreless grinding operation. CO3 (06)

6. a) It is required to drill a hole of larger diameter in heavier workpiece. Suggest the drilling machine and explain it with a neat sketch. CO3 (10)
b) Explain any three drilling operations with appropriate sketches. CO3 (06)
c) Define facing, knurling, taper turning and dressing. CO3 (04)

UNIT- IV

7. a) Differentiate between CNC and NC machines. CO4 (04)
b) Define welding process, sketch and explain the principle of arc welding process. CO4 (08)
c) Sketch and explain any two types of journal bearings. CO4 (08)
8. a) With neat sketches explain the different types of flames used in oxyacetylene gas welding and specify their applications. CO4 (08)
b) Differentiate between welding, soldering and brazing. CO4 (06)
c) Classify bearings. Sketch and explain any one type of rolling contact bearings. CO4 (06)

UNIT- V

9. a) Derive an expression for length of the belt used for cross belt drive system. CO5 (10)
b) A cross belt connects two pulleys mounted on parallel shafts, one 0.45m diameter and other 0.2m diameter. The distance between the center lines of the shafts is 1.95m. Find the length of the belt required and the angle of contact between the belt and pulley. Also determine the power transmitted by the belt when the larger pulley rotates at 200 rev/ min. The maximum permissible tension in the belt is 1 kN and the coefficient of friction between the belt and the pulley is 0.25. CO5 (10)
10. a) Briefly explain the following gear drives with neat sketches (i) Spur gear (ii) Helical gear (iii) Bevel gear (iv) Rack & Pinion. CO5 (08)
b) Derive an expression for ratio of belt tensions in open flat belt drive system with usual notations. CO5 (08)
c) List out the applications of Rapid Prototyping technologies. CO5 (04)



MAKEUP EXAMINATIONS – FEBRUARY 2019

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non programmable calculator and Steam tables are allowed.

UNIT-I

1. a) With a neat sketch explain the working principle of geothermal plant. CO1 (08)
b) With a help of temperature enthalpy diagram, explain the mechanism of formation of steam at constant pressure. CO1 (06)
c) Determine the amount of heat supplied to convert 6 kg wet steam of dryness fraction of 0.75 passes from a boiler to a super heater at a constant pressure of 1 Bar abs and super-heated temperature of 350°C. The specific heat of superheated steam is $C_{ps} = 2.25\text{Kj/kg K}$. CO1 (06)

2. a) With a neat sketch explain the working of impulse type water turbine. CO1 (12)
b) What is compounding of steam turbines? With neat sketch explain in brief different types of compounding. CO1 (08)

UNIT-II

3. a) With necessary diagrams, explain the working principle of four stroke compression ignition [CI] engine. CO2 (10)
b) The following observations were obtained during a trial on four stroke diesel engine. Cylinder diameter= 20cm,stroke of the piston=45cm, crank shaft , speed=360rpm, brake load=80kg, Brake drum diameter =1.8m ,mean effective pressure=8 Bar , diesel consumption is 0.1 liter / minute , specific gravity of Diesel=0.78, calorific value of Diesel=43,000 KJ/Kg. Find Brake power, Indicated Power, Frictional power, mechanical efficiency, frictional power, Mechanical efficiency, brake thermal efficiency and Indicated thermal efficiency. CO2 (10)

4. a) Describe with a neat sketch explain the working principle of Vapor absorption refrigeration systems and explain how it is different with vapor compression refrigeration system. CO2 (12)
b) Explain the construction and working of a window type air conditioner. CO2 (08)

UNIT-III

5. a) With neat Sketch label the parts of an Engine Lathe. CO3 (08)
b) Explain with neat sketches the following lathe operations CO3 (12)
i. Facing ii. Drilling iii. Knurling.

6. a) With neat sketches differentiate between: CO3 (08)
i. Boring and tapping ii. Counter sinking and counter boring.
b) Explain the following milling operations with neat sketches: CO3 (12)
i. Thread milling ii. Face Milling iii. slot Milling.

UNIT- IV

7. a) Explain in brief with neat sketches: CO4 (08)
- i. Principle of electric arc welding
 - ii. Soldering operations.
- b) What are the types of rapid prototyping processes? mention their advantages and Limitations. CO4 (06)
- c) How do you classify bearings, Differentiate between sliding contact and rolling contact bearings? CO4 (06)
8. a) Explain with neat sketches: CO4 (12)
- (i) Ball bearings (ii) Pedestal bearings.
- b) Give short notes on : CO4 (08)
- i) CNC Machine.
 - ii) NC Machine

Open loop and close loop system

UNIT-V

9. a) With neat sketch explain: CO5 (08)
- i) Cross belt drive ii) Stepped cone pulley drive.
- b) Sketch and explain the compound gear Train. CO5 (06)
- c) In a cross belt drive the difference in tension between tight side and slack side of the belt is 1000N. find the tension on slack slide and tight side, if the angle of contact is 160° and coefficient of friction is 0.25. CO5 (06)
10. a) With neat sketch explain the following: CO5 (12)
- i) Needle type Lubricator ii) Splash lubricator.
- 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. CO5 (08)

**SEMESTER END EXAMINATIONS – JANUARY 2018**

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Subject : **Elements of Mechanical Engineering**
Subject Code : **ME101/201**

Semester : **I/II**
Max. Marks : **100**
Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- Assume missing data if any suitably.

UNIT- I

1. a) State the advantages of non-conventional energy sources over the conventional Sources. CO1 (05)
- b) With a neat sketch of nuclear power plant explain its working briefly. CO1 (10)
- c) Define the following: CO1 (05)
 - i) Sensible heat
 - ii) Enthalpy
 - iii) Internal Energy
 - iv) Specific volume
 - v) Degree of superheat.
2. a) Explain the working of a Lancashire boiler with a neat sketch. CO1 (10)
- b) State the differences between closed cycle and open cycle gas turbines. CO1 (06)
- c) Classify the hydraulic turbines. CO1 (04)

UNIT- II

3. a) With a neat sketch explain the parts of I.C. engine. CO2 (08)
- b) A two stroke diesel engine has a piston diameter of 200 mm and a stroke of 300 mm. It has mean effective pressure of 2.8 bar and a speed of 400 rpm. The diameter of the brake drum is 1 meter and the effective brake load is 64 kg. Find the indicated power, brake power and the mechanical efficiency.
4. a) With a neat sketch, explain the working principle of a vapor compression refrigerator. CO2 (08)
- b) What are the desirable properties of an ideal refrigerant? CO2 (04)
- c) With a neat sketch, explain the working principle of a window air conditioner. CO2 (08)

UNIT- III

5. a) Explain any two taper turning methods performed on lathe with neat sketches. CO3 (08)
- b) Give the Specifications of lathe. CO3 (04)
- c) List the various drilling machine operations and explain any two with neat sketches. CO3 (08)
6. a) With a neat sketch, explain the working principle of Radial Drilling machine. CO3 (08)
- b) Define Grinding and explain Cylindrical grinding. CO3 (06)
- c) Differentiate between Up milling and down milling. CO3 (06)

UNIT- IV

7. a) Explain the working principle of electric arc welding process with a neat sketch. CO4 (10)
- b) Define soldering and brazing. CO4 (04)
- c) State the advantages of CNC machines. CO4 (06)
8. a) Write short notes on the following: CO4 (12)
- i) Ball Bearings
 - ii) Pedestal Bearings
 - iii) Roller bearings.
- b) With a neat sketch, explain the working principle of Thrust Bearings. CO4 (08)

UNIT- V

9. a) Derive an expression for the length of the belt in an open drive system. CO5 (10)
- b) Explain in detail SLA, FDM and LOM in rapid prototyping. CO5 (10)
10. a) Differentiate clearly between: CO5 (10)
- i) Simple and compound gear train.
 - ii) Velocity ratio and gear ratio.
- b) A person riding a bicycle turns the pedal at 40 rpm. Find the speed of the wheel, if the number of teeth in the driving sprocket is 50 and in the driven sprocket is 25. CO5 (04)
- c) Explain the slip and creep of belt drive. CO5 (06)

**MAKEUP EXAMINATIONS – FEBRUARY 2018**

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Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) With a neat sketch explain the functioning of Geothermal power plant. CO1 (10)
b) With a help of temperature enthalpy diagram, explain the mechanism of formation of steam at constant pressure. CO1 (10)
2. a) Sketch and explain Babcock and Wilcox water tube boiler. CO1 (12)
b) Sketch and label the Francis turbine and explain the working. CO1 (08)

UNIT- II

3. a) With necessary diagrams, explain the working principle of 4 stroke diesel engine. CO2 (10)
b) A single cylinder 4 stroke engine runs at 1000 rpm and has a bore of 115mm and a stroke of 140mm. The brake load is 60N at 600mm radius and the mechanical efficiency is 80%. Calculate brake power and mean effective pressure. CO2 (10)
4. a) Define:
(i) Refrigerant (ii) Refrigerating effect (iii) COP (iv) air conditioning. CO2 (04)
b) With a neat diagram explain the essential parts of a refrigerator and their functions. CO2 (10)
c) The following observations were obtained during a trial on a four-stroke diesel engine Cylinder diameter = 25cms, Stroke of the piston= 40cms, Crank shaft speed = 250rpm, Brake load = 70kg, Brake drum diameter = 2m, Mean effective pressure = 6bar, Diesel oil consumption = 0.1m³/min, Specific gravity of diesel = 0.78, Calorific value of diesel = 43900kJ/kg. Find (i) Brake Power, (ii) Indicated power (iii) Mechanical Efficiency. CO2 (06)

UNIT- III

5. a) Sketch and explain a type of taper turning method employed on a centre lathe for producing short work pieces having a very large taper angle. Name the other methods of taper turning. CO3 (08)
b) Sketch slotting, angular milling and form milling operations. CO3 (06)
c) Sketch a radial drilling machine and label the parts. Name the important property of a cutting tool material for its selection for machining a work piece material. CO3 (06)

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6. a) Sketch a column and knee type horizontal spindle milling machine and label the parts. CO3 (08)
b) Sketch surface grinding and internal cylindrical grinding operations. CO3 (06)
c) Differentiate between dressing and truing of grinding wheels. Give examples of abrasives and bonding materials used. CO3 (06)

UNIT- IV

7. a) What are the advantages and disadvantages of CNC? CO4 (05)
b) List the applications of NC machines. CO4 (07)
c) Define welding. How are welding processes classified? CO4 (08)
8. a) Differentiate between sliding contact and rolling contact bearings. CO4 (06)
b) With the help of necessary sketches explain Oxy-acetylene welding. CO4 (08)
c) Explain in brief about the electrodes used in arc welding. CO4 (06)

UNIT- V

9. a) Write a note on creep and slip in belt drives. $T_1 - T_2 = \mu R = \delta T$ Explain the physical significance of the above equation with reference to belt drives. CO5 (08)
b) Sketch and label a tell tale lubricator and a drop feed lubricator. CO5 (05)
c) Derive the expression for the velocity ratio of a compound gear train consisting of four gears. There is a driver gear and a driven gear in the gear train. CO5 (07)
10. a) What are the advantages of gear drives over belt drives? CO5 (04)
b) Derive $[T_2 (e^{\mu\theta})] - T_1 = 0$ with usual notations in an open belt drive system. CO5 (10)
c) Sketch and explain the spur gear nomenclature. CO5 (06)

**SEMESTER END EXAMINATIONS - MAY/JUNE 2018**

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

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|--|-----|------|
| 1. a) Sketch and explain Babcock and Wilcox boiler. | CO1 | (12) |
| b) Sketch, label parts of Pelton wheel and explain its working. | CO1 | (08) |
| 2. a) Explain the working of Lancashire boiler with neat labeled sketch. | CO1 | (10) |
| b) With help of temperature-enthalpy diagram explain the process of formation of steam at constant pressure. | CO1 | (10) |

UNIT- II

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|--|-----|------|
| 3. a) Explain with a neat sketch naming all the parts, the working of a single cylinder four stroke SI engine. | CO2 | (10) |
| b) Following data are collected from a four stroke single cylinder engine. Bore = 100mm, stroke = 280mm, speed = 300 rpm, Indicated mean effective pressure = 6 bar, torque on the brake drum = 250Nm, oil consumed = 4.2kg/hour and calorific value of oil 41000 kJ/kg. Determine Mechanical efficiency, Indicated thermal efficiency, Brake thermal efficiency, ISFC & BSFC. | CO2 | (10) |
| 4. a) Describe with a neat sketch explain the working of vapor compression refrigeration system. | CO2 | (10) |
| b) Explain the construction and working of a room air conditioner. | CO2 | (05) |
| c) Discuss the desired Properties of refrigerant. | CO2 | (05) |

UNIT- III

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|--|-----|------|
| 5. a) With a neat sketch explain the working principle of Lathe. | CO3 | (12) |
| b) With a neat sketch explain the lathe operation:
i) Cylindrical turning ii) Taper turning. | CO3 | (08) |
| 6. a) With a neat sketch explain the construction and working of a Radial Drilling Machine. | CO3 | (10) |
| b) Compare Up milling and Down Milling. | CO3 | (05) |
| c) Write short notes on cylindrical grinding. | CO3 | (05) |

UNIT- IV

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|--|-----|------|
| 7. a) Explain with a suitable example open loop and closed loop control system used in NC. | CO4 | (10) |
| b) With a block diagram, explain the elements of NC Machine. | CO4 | (10) |
| 8. a) With neat sketches, explain the different types of flames used in gas welding. | CO4 | (08) |
| b) Explain with sketches journal bearing and thrust bearing. | CO4 | (12) |

UNIT- V

9. a) Derive an expression for the length of the belt in an open belt drive. CO5 (08)
- b) A compound gear train consists of 4 gears A, B, C and D and they have 20, 30, 40 and 60 teeth respectively. Gear 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. Show the arrangement of gears. If A rotates at 180 rpm, find the speed of gear D. CO5 (07)
- c) What is rapid prototyping? Explain the steps involved in additive manufacturing. CO5 (05)
10. a) With a sketch explain and write train value for:
i) Simple gear train ii) Compound gear train. CO5 (07)
- b) A shaft running at 160 rpm is to drive another shaft at 250 rpm and to transmit 20 kW. The coefficient of friction between belt and the pulley is 0.25. the diameter of the smaller pulley is 0.6 m and the distance between the shaft center is 2.75 m. determine the length of the belt, tight side and slack side tension when two pulleys are connected by open belt. CO5 (07)
- c) Explain the following process:
i) Stereolithography (SLA) ii) Fused deposition modeling (FDM). CO5 (06)

**MAKEUP EXAMINATIONS – JUNE/JULY 2018**

Course & Branch : **B.E. : Common to all branches**
Subject : **Elements of Mechanical Engineering**
Subject Code : **ME101/201**

Semester : **I/II**
Max. Marks : **100**
Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Discuss briefly the different types of conventional energy sources. CO1 (06)
b) Define different states of steam with help of T-S diagram. CO1 (04)
c) With neat sketch explain the working of Lancashire boiler. CO1 (10)
2. a) With a neat sketch explain the working of ocean thermal energy conversion. CO1 (06)
b) Determine the quantity of heat required to generate 1 kg of steam at a pressure of 7 bar absolute from water at a temperature of 25°C.
i) When the dryness fraction is 0.88 ii) when the steam is just dry
iii) when it is superheated at constant pressure to 270°C, assuming the mean specific heat of superheated steam to be 2.3 kJ/kg K.
c) With neat sketch explain the function of different elements in open cycle gas turbine. CO1 (04)

UNIT- II

3. a) Explain with a neat sketch naming all the parts, the working of a single cylinder four stroke CI ENGINE. CO2 (10)
b) Following data are collected from a four stroke single cylinder engine. Bore = 100mm, stroke = 280mm, speed = 300 rpm, Indicated mean effective pressure = 5 bar, torque on the brake drum = 250Nm , oil consumed = 4.2kg/hour and calorific value of oil 41000 kJ/kg. Determine Mechanical efficiency , Indicated thermal efficiency and Brake thermal efficiency. CO2 (10)
4. a) Describe with a neat sketch explain the working of Vapor compression refrigeration. CO2 (10)
b) Explain the construction and working of a room air conditioner. CO2 (05)
c) What are the desirable properties of refrigerant? CO2 (05)

UNIT- III

5. a) Sketch and explain the working of radial drilling machine. CO3 (07)
b) Explain the following operations: i) straddle milling ii) form milling iii) angular milling iv) end milling
c) With a suitable sketch explain the operation of surface grinding. CO3 (05)
6. a) How lathe is specified? Write the line diagram indicating major parts of lathe. CO3 (07)
b) Draw a schematic sketch of horizontal milling machine and briefly explain the function of its main parts. CO3 (08)
c) Explain the following operation: i) Reaming ii) countersinking. CO3 (05)

UNIT- IV

7. a) Explain the working principle of electric arc welding process with a neat sketch. CO4 (10)
b) State the advantages of CNC machine. CO4 (06)
c) Define soldering and brazing. CO4 (04)
8. a) Differentiate between sliding contact and rolling contact bearings. CO4 (06)
b) With the help of relevant sketch explain oxy acetylene welding flames. CO4 (08)
c) With neat sketch explain the working of ball bearing. CO4 (06)

UNIT- V

9. a) Derive an expression for length of belt in open belt drive. CO5 (10)
b) Briefly explain the following gear drives with a neat sketches: CO5 (10)
i) Spur gear ii) Helical gears iii) Bevel gears iv) Rack and Pinion.
10. a) A compound gear train formed by 4 gears P, Q, R and S. Gear P meshes with gear Q and gear R meshes with S. Gear Q and R are compounded. P is connected to the driving shaft and S is connected with driven shaft and power is transmitted. The details of the gears are

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

If Gear S were to rotate at 60 rpm. Calculate the Speed of P. Represent the gear arrangement schematically.

- b) Define Rapid Prototyping, classify based on its application and briefly explain SLA process. CO5 (10)

**SUPPLEMENTARY SEMESTER EXAMINATIONS - JULY/AUGUST 2018**

Course & Branch : B.E. : Common to all branches
Subject : Elements of Mechanical Engineering
Subject Code : ME101/201

Semester : I/II
Max. Marks : 100
Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Sketch and explain the construction and working principle of a water tube boiler. CO1 (10)
b) What are the differences between renewable and non renewable sources of energy (Any 4)? CO1 (04)
c) Write the expressions for the internal energy, enthalpy and work done due to evaporation of dry steam and super heated steam. CO1 (06)
2. a) Differentiate between open cycle and closed cycle gas turbines. CO1 (06)
b) Differentiate between impulse and reaction water turbines with examples. CO1 (07)
c) What do you mean compounding of steam turbine ? What are there types? Explain any one. CO1 (07)

UNIT- II

3. a) Differentiate between Compression Ignition and Spark Ignition engines. IC CO2 (07)
b) What are the advantages of diesel engines over petrol engines? CO2 (06)
c) Sketch and explain the working principle of a window air conditioner. CO2 (07)
4. a) A 2 stroke 4 cylinder oil engine develops 30KW at 2500RPM. The $P_m = 7$ bar. Mechanical efficiency = 80%. Stroke to Bore ratio = 1.5 Calculate the specific fuel consumption, stroke and bore if B.T.E is 28%. The C.V of the oil is 43900KJ/Kg. CO2 (10)
b) Two petrol engines P and Q having same swept volumes burns 3.2 Kg per hour and 4 liters per hour respectively and develop same Brake power. If the specific gravity of the fuel is 0.8 which engine would you prefer and why? CO2 (04)
c) Compare refrigeration systems and air conditioning systems. CO2 (06)

UNIT- III

5. a) With a neat sketch explain the working principle of Lathe. CO3 (12)
b) With a neat sketch explain the lathe operation:
i) Cylindrical turning ii) Taper turning. CO3 (08)
6. a) With a neat sketch explain the construction and working of a Radial Drilling Machine. CO3 (10)
b) Compare Up milling and Down Milling operations. CO3 (05)
c) Write short notes on centre less grinding operation. CO3 (05)

UNIT- IV

7. a) Explain with a suitable example open loop and closed loop control system used in NC. CO4 (10)
b) Discuss the advantages and disadvantages of NC and compare with CNC. CO4 (10)

8. a) With a neat sketches explain the different types of flames used in gas welding. CO4 (10)
b) Define soldering, brazing and welding, differentiate between brazing and welding. CO4 (10)

UNIT- V

9. a) With neat sketches explain the following terms used in belt drives
(i) Arc of contact, (ii) Speed ratio (iii) Tight and slack sides (iv) Open and cross belt drive. CO5 (08)
b) What is creep in belt drives? Explain. CO5 (04)
c) Derive an expression for the ratio of belt tensions in a flat belt drive CO5 (08)
10. a) Define velocity ratio and Train ratio. CO5 (02)
b) Draw a neat sketch and explain the following related to spur gears
(i) Addendum circle (ii) Pitch circle (iii) Dedendum circle (iv) Pitch circle diameter (v) Face width (vi) Circular pitch. CO5 (10)
c) A compound gear train is formed by 4 gears P,Q, R and S. Gear P meshes with gear Q and gear R meshed with gear S. Gears 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: CO5 (08)

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

If the gear S were to rotate at 60rpm. Calculate the speed of P.
Represent the gear arrangement schematically.


SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY 2017

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Semester : **I/II**
Max. Marks : **100**
Duration : **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- Non Programmable Calculator and Steam tables are allowed

UNIT – I

1. a) Give the comparison between the renewable and non-renewable energy sources. CO1 (06)
b) With neat sketch explain the harnessing of geothermal energy. CO1 (06)
c) With the help temperature enthalpy diagram, explain the formation of steam at constant pressure. CO1 (08)
2. a) Define compounding of impulse turbine. Name the various methods of compounding and explain any one method. CO1 (06)
b) Define water turbine. With neat sketch explain the mixed flow reaction turbine used for medium heads. CO1 (06)
c) Calculate the specific volume and enthalpy of 8kg of steam at 1.2MPa when:
i) The steam is 12% wet
ii) The steam is superheated at 300°C. CO1 (08)

UNIT – II

3. a) Explain the functions of the following IC engine parts:
i) Cylinder ii) Piston iii) Valves. CO2 (06)
b) Give the comparison between the vapour compression and vapour absorption refrigerator system. CO2 (06)
c) With the help of PV diagram, explain the working principle four stroke compression ignition engine. CO2 (08)
4. a) A single cylinder 4-s engine runs at 1000rpm and has a bore of 115mm and a stroke of 140mm. the brake load is 60N at 600mm radius and the thermal efficiency is 80%. Calculate brake power and mean effective pressure. CO2 (06)
b) Define refrigerant. What are the properties of a good refrigerant? CO2 (06)
c) With neat sketch explain the working principle of room air conditioner. CO2 (08)

UNIT – III

5. a) Draw a neat sketch of engine Lathe and label the parts CO3 (08)
b) With neat sketches, explain the following lathe operations:
i) Thread cutting
ii) Taper turning by swiveling compound rest
iii) Facing. CO3 (06)
c) Differentiate between:
i) Drilling and Boring
ii) Counter sinking and Counter boring. CO3 (06)

ME 101/201

6. a) Draw a neat sketch and explain Horizontal milling machine and label its parts. CO3 (06)
b) Explain the following with sketches: CO3 (04)
 i) Up milling
 ii) Down milling.
c) How are abrasives classified? Give example of each type. CO3 (04)
d) Distinguish between cylindrical grinding and surface grinding. CO3 (06)

UNIT - IV

7. a) Explain in brief with neat sketches: CO4 (08)
 i) Principle of arc welding
 ii) Brazing operations.
b) What are the types of rapid prototyping process? mention their advantages and Limitations. CO4 (06)
c) How do you classify bearings, Differentiate between sliding contact and rolling contact bearings? CO4 (06)
8. a) Explain with neat sketches: CO4 (08)
 i) Ball bearings
 ii) Pedestal bearings.
b) Give short notes on: CO4 (12)
 i) CNC Machine
 ii) NC Machine
 iii) DNC
 iv) Open loop and close loop system.

UNIT - V

9. a) Derive an expression for Length of belt for open belt drive. CO5 (08)
b) Sketch and explain the Reverted gear Train. CO5 (06)
c) In a cross belt drive the difference in tension between tight side and slack side of the belt is 1000N. find the tension on slack slide and tight side, if the angle of contact is 160° CO5 (06)
10. a) With neat sketch explain the following: CO5 (12)
 i) Needle type Lubricator
 ii) Splash lubricator.
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. CO5 (08)


SEMESTER END EXAMINATIONS – MAY/JUNE 2017

Course & Branch : B.E.: Common to all branches	Semester : I/II
Subject : Elements of Mechanical Engineering	Max. Marks : 100
Subject Code : ME101/201	Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table is permitted.
- Missing data if any may be suitably assumed.
- Draw only neat sketches wherever necessary.

UNIT – I

1. a) Give the comparison between the renewable and conventional energy resources. CO1 (06)
- b) Explain with neat sketch the generation of electricity using the temperature difference of ocean water at different depths. CO1 (06)
- c) Find the enthalpy of 0.5kg of steam at a pressure of 10bar absolute for the following conditions:
 - i) It is 1.5% wet
 - ii) It is dry saturated
 - iii) It is at a temperature of 200°C

Assume specific heat as 2.3kJ/kg K.

2. a) Give a brief comparison between reaction water turbine and impulse water turbine. CO1 (06)
- b) Define Compounding. Name the different methods of compounding and explain any one method. CO1 (06)
- c) With neat sketch explain the working principle of water tube boiler. CO1 (08)

UNIT – II

3. a) Give the comparisons between 4 stroke and 2 stroke engines. CO2 (04)
 - b) With a neat PV diagram, explain the working of 4 stroke petrol engine. CO2 (08)
 - c) A person conducted a test on a single cylinder two stroke petrol engine and found that the mechanical and brake thermal efficiencies of the engine were 0.7 and 0.2 respectively. The engine with a mean effective pressure of 6 bar ran at 300 rev/min consuming fuel at a rate of 2.2 kg/hour. Given that the calorific value of the fuel is 42500 kJ/kg and that the stroke to bore ratio of the engine cylinder is 1.2. Find the bore, stroke of the engine in cm and speed of the piston.
4. a) What will happen if we use diesel in a petrol engine? Explain. CO2 (04)
 - b) What are the desirable properties of a good refrigerant? List any four refrigerants. CO2 (08)
 - c) With a schematic diagram explain the working of a vapour compression window type room air conditioner. CO2 (08)

ME101/ME201

UNIT – III

5. a) With neat sketches explain the following lathe operations. CO3 (08)
i) Taper turning ii) thread cutting iii) facing.
b) With a schematic diagram show how a centre lathe is specified. CO3 (04)
c) Explain the following drilling operations. CO3 (08)
i) Reaming ii) counter boring iii) tapping .
6. a) Differentiate between up milling and down milling with neat sketches. CO3 (06)
b) With neat sketches explain any two operations performed on a horizontal milling machine. CO3 (06)
c) Explain the following with reference to grinding machine. CO3 (06)
i) Grinding wheel ii) Dressing and truing.
d) How does centre less grinding differs from centre type grinding? CO3 (02)

UNIT – IV

7. a) Give the comparison between NC and CNC Machines. CO4 (06)
b) Define welding and their advantages and disadvantages. CO4 (06)
c) With neat sketch explain the Oxy acetylene gas welding with different types of flames. CO4 (08)
8. a) Define bearing and give the classification of bearings. CO4 (06)
b) Distinguish between SLA and FDM process. CO4 (06)
c) Explain i. Ball bearing and ii. Roller bearing. CO4 (08)

UNIT – V

9. a) Derive an expression for length of the belt used for open belt drive system. CO5 (10)
b) A cross belt connects two pulleys mounted on parallel shafts, one 0.45m diameter and other 0.2 diameter. The distance between the center lines of the shafts is 1.95m. Find the length of the belt required and the angle of contact between the belt and pulley. Also determine the power transmitted by the belt when the larger pulley rotates at 200 rev/ min. The maximum permissible tension in the belt is 1 kN and the coefficient of friction between the belt and the pulley is 0.25. CO5 (10)
10. a) Briefly explain the following gear drives with neat sketches: CO5 (12)
i) Spur gear ii) Helical gear
iii) Bevel gear iv) Rack & Pinion.
b) Mention the use of stepped cone pulley and Jockey pulley. CO5 (04)
c) Sketch the method of lubrication used in 4 stroke IC's engines. CO5 (04)

**MAKEUP EXAMINATIONS – MAY/JUNE 2017**

Course & Branch :	B.E.: Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/ME201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table is permitted.
- Missing data if any may be suitably assumed.
- Draw only neat sketches wherever necessary.

UNIT – I

1. a) State advantages and disadvantages of the following: CO1 (08)
- i) Renewable energy sources
 - ii) Non-renewable energy sources.
- b) Write a short note on Geothermal energy source. CO1 (06)
- c) Find the total heat when water at 20°C is heated at constant pressure of 2.5bar absolute and evaporated into steam with a dryness fraction 0.85. CO1 (06)
2. a) What is compounding of steam turbines? Name different methods of compounding of steam turbines. CO1 (04)
- b) Explain with a neat sketch the principle of working of Kaplan turbine. CO1 (08)
- c) With a neat sketch explain the working principle of gas turbine working on open cycle. CO1 (08)

UNIT – II

3. a) How are IC Engines classified? CO2 (04)
- b) Explain the working of a two stroke diesel engine with a neat sketches. CO2 (10)
- c) Find the indicated power of a four stroke petrol engine of swept volume of 6 liters and running at 1000rpm. The mean effective pressure is 600kN/m². CO2 (06)
4. a) Define the following: CO2 (04)
- | | |
|---------------------|-------------------------|
| i) Brake power | ii) Indicated power |
| iii) Friction power | iv) Thermal efficiency. |
- b) Briefly explain the properties of a good refrigerant. CO2 (06)
- c) Explain the principle of working of a window air conditioner with neat schematic diagram. CO2 (10)

UNIT – III

5. a) Explain with a neat sketch the construction of engine lathe. CO3 (10)
- b) Explain with neat sketches the following drilling operations. CO3 (10)
- | | | |
|------------------|-------------|----------------------|
| i) Counterboring | ii) Reaming | iii) Countersinking. |
|------------------|-------------|----------------------|
6. a) Differentiate between Up-milling and Down-milling operations. CO3 (05)
- b) Explain with neat sketches the following milling operations. CO3 (09)
- | | | |
|----------------|------------------|--------------------|
| i) End milling | ii) Form milling | iii) Gang milling. |
|----------------|------------------|--------------------|
- c) Explain briefly the principle of Centerless grinding. CO3 (06)

ME101/ME201

UNIT – IV

7. a) What are the basic components of Numerical control system? List the CO4 (04)
advantages of CNC.
- b) Describe the principle of Arc welding with a neat sketch. CO4 (08)
- c) Explain different types of flames in oxyacetylene welding. CO4 (08)
8. a) What is the difference between sliding and rolling contact bearings? CO4 (04)
Give example for each.
- b) Explain with a neat sketch Bushed bearing. CO4 (06)
- c) Define Rapid prototyping. Classify RP process based on liquid material. CO4 (05)
- d) What is the significance of cross hatching in LOM process and also list CO4 (05)
process parameters?

UNIT – V

9. a) Derive the expression for the ratio of tensions in a flat belt drive. CO5 (10)
- b) What are the advantages and disadvantages of gear drives over other CO5 (06)
drives?
- c) In a belt drive, the velocity ratio is 3. The driving pulley runs at CO5 (04)
400rpm. The diameter of driven pulley is 30cm. Find the speed of the
driven pulley and the diameter of the driving pulley.
10. a) What is compound gear train? Derive the expression for the velocity CO5 (07)
ratio of a compound gear train.
- b) A compound gear train consists of four gears P, Q, R and S having 20, CO5 (07)
40, 60 and 80 teeth respectively. The gear P is keyed to driving shaft.
Gear S to driven shaft, Q and R are compound gears. The gear Q
meshes with P and R meshes with S. If P rotates at 150rpm, what is
the RPM of gear S? Show gear arrangement.
- c) What is lubrication? What are the desirable properties of a good CO5 (06)
lubricant?


SEMESTER END EXAMINATIONS – JANUARY 2017

Course & Branch : B.E.: Common to All Branches
Subject : Elements of Mechanical Engineering
Subject Code : ME 101/201

Semester : I/II
Max. Marks : 100
Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non Programmable Calculator and Steam tables are allowed.

UNIT – I

1. a) Distinguish between conventional and non-conventional sources of energy. CO1 (06)
b) Describe briefly the ocean thermal energy source and its conversion. CO1 (08)
c) Define the following:
i) Dryness fraction ii)Enthalpy iii)Latent heat
iv) Internal energy v)Specific volume vi)Super heat.
2. a) Explain with a neat sketch the working of a Lancashire boiler. CO1 (10)
b) Explain with a neat sketch high head water turbine. CO1 (05)
c) Find the enthalpy of 0.5kg of steam at a pressure of 10 bar absolute CO1 (05)
for the following conditions:
i) It is 1.5% wet
ii) It is dry saturated
iii) It is at a temperature of 200°C. Assume specific heat as 2.3kJ/kg k.

UNIT – II

3. a) With P-V diagram, describe the working of four stroke diesel engine CO2 (08)
b) Define following:
i) BP ii)SFC iii)Thermal Efficiency
iv) Mean effective pressure.
c) The following are the details of a 4-Stroke petrol engine: CO2 (08)
Diameter of brake drum=60.03cm, Full brake load on drum=250,
Brake drum speed=450rpm, Calorific value of petrol=40MJ/kg, Brake
thermal efficiency=32%, mechanical efficiency=80%, specific gravity of
petrol=0.82. determine:
i) brake power
ii) indicated power
iii) fuel consumption in litres per second
iv) indicated thermal efficiency.
4. a) With schematic diagram explain the working of a vapour compression CO2 (08)
refrigerator.
b) Define the following: CO2 (06)
i) COP ii)Ton of refrigerant iii) Refrigeration effect.
c) List out the desirable properties of a good refrigerant and name few CO2 (06)
refrigerants.

UNIT – III

5. a) With neat Sketch label the parts of a Engine Lathe. CO3 (08)
b) Explain with neat sketches the following lathe operations : CO3 (12)
 i) Facing
 ii) Drilling
 iii) Taper turning.
6. a) With neat sketches differentiate between: CO3 (08)
 i) Boring and reaming
 ii) Counter sinking and counter boring.
b) Explain the following milling operations with neat sketches: CO3 (12)
 i) Form milling
 ii) Face Milling
 iii) Gang Milling.

UNIT – IV

7. a) What are the advantages and disadvantages of CNC machines? CO4 (06)
b) Give the comparison between brazing and soldering. CO4 (06)
c) With neat sketch explain the following: CO4 (08)
 i) Pivot bearing
 ii) Cylindrical roller bearing.
8. a) Compare the advantage and limitations of SLA process with that of FDM. CO4 (06)
b) Define bearing. Give the classification of bearings with examples. CO4 (06)
c) Explain the principle and operation of electric arc welding process. CO4 (08)

UNIT – V

9. a) Derive an expression for ratio of belt tensions for flat belt drive. CO5 (06)
b) Explain the fast and loose pulley. CO5 (06)
c) With neat sketch explain the spur gear terminology. CO5 (08)
10. a) Explain spur gear and bevel gear. CO5 (06)
b) Two parallel shafts 6m apart are provided with 300mm and 400mm diameter pulleys and are connected by a cross belt. The direction of rotation of the follower pulley is to be reversed by changing over to an open belt drive. How much length of belt should be changed? CO5 (06)
c) Explain the following : CO5 (08)
 i) Tell-tale lubricator
 ii) Wick feed lubricator.


MAKE UP EXAMINATIONS – FEBRUARY 2017

Course & Branch : **B.E.: Common to all branches** **Semester :** **I/II**
Subject : **Elements of Mechanical Engineering** **Max. Marks :** **100**
Subject Code : **ME101/201** **Duration :** **3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table permitted.

UNIT – I

1. a) Distinguish between conventional and non-conventional sources of energy. CO1 (04)
- b) Steam at 15bar has specific volume of $0.12\text{m}^3/\text{kg}$. Determine the temperature, enthalpy and internal energy of steam. CO1 (10)
- c) What are the functions of boiler mountings and accessories? Give four examples for each. CO1 (06)

2. a) Differentiate between impulse and reaction steam turbines. CO1 (06)
- b) Explain with a neat sketch the principle of working of kaplas turbine. CO1 (08)
- c) Differentiate between open cycle and closed cycle gas turbines, along with sketches. CO1 (06)

UNIT – II

3. a) Explain with neat sketches the working of two stroke petrol engine. CO2 (10)
- b) The following data is collected from a four stroke single cylinder oil engine running at full load. Bore – 200mm, Stroke – 280mm, Speed – 300mm, Indicated mean effective pressure – 6bar, Torque on brake drum – 250Nm, Oil consumed – 4.2kg/hr, Calorific value of oil used – 42000kJ/kg. Calculate BP, IP, Mechanical efficiency, Indicated thermal efficiency and Brake thermal efficiency.

4. a) Write any four differences between SI and CI engines. CO2 (04)
- b) Write the desirable properties of a good refrigerant. List various refrigerants used. CO2 (06)
- c) Explain with a neat sketch the working of vapour compression refrigerator. CO2 (10)

UNIT - III

5. a) Explain with the neat diagram the working principle of engine lathe. CO3 (10)
b) Explain with neat sketches the following drilling operations: CO3 (10)
 i) Counter boring ii) Boring iii) Tapping.
6. a) Sketch and explain the working of a vertical milling machine. CO3 (08)
b) Write any four differences between Up milling and Down milling operations, with sketches. CO3 (06)
c) What is grinding? Explain with a neat sketch the operation of surface grinding. CO3 (06)

UNIT - IV

7. a) List the advantages of NC machines over conventional machine tools. CO4 (04)
b) With the help of neat sketch explain oxyacetylene gas welding. CO4 (08)
c) Explain soldering. Write the differences between soldering and brazing operations. CO4 (08)
8. a) What is a bearing? How are they classified? CO4 (04)
b) With a neat sketch explain foot step bearing. CO4 (08)
c) Draw the diagram to illustrate Stereolithography process and list the process parameters. CO4 (08)

UNIT - V

9. a) Write the comparison between belt drives and gear drives. CO5 (04)
b) Briefly explain the following gear drives with neat sketches. CO5 (12)
 i) Spiral gears ii) Bevel gears iii) Rack and pinion.
c) A person riding a bicycle turns the pedal at 40 rpm. Find the speed of the wheel, if the number of teeth on the driving sprocket is 50 and that on the driven sprocket is 25. CO5 (04)
10. a) What is a compound gear train? Derive the expression for the velocity ratio of compound train. CO5 (10)
b) Classify different methods of lubrication. Explain with a neat sketch the working of siphon wick lubricator. CO5 (10)

**M S RAMAIAH INSTITUTE OF TECHNOLOGY**

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – MAY/JUNE 2016Course & Branch : **B.E. – Common to all branches**Semester : **I/II**Subject : **Elements of Mechanical Engineering**Max. Marks : **100**Subject Code : **ME101/ME201**Duration : **3 Hrs****Instructions to the Candidates:**

- Answer one full question from each unit.

UNIT – I

1. a) Explain with neat sketch working of Ocean Thermal Energy Conversion system. CO1 (06)
b) With the help of temperature–enthalpy diagram, explain the mechanism of formation of steam at constant pressure. CO1 (06)
C) With the help of pressure velocity diagram, explain the Parson's turbine. CO1 (08)
2. a) Define water turbine. Give classification of water turbine with examples. CO1 (06)
b) Give the comparison between open cycle and closed cycle gas turbine. CO1 (06)
c) Explain with neat sketch the construction and working of water tube boiler. CO1 (08)

UNIT – II

3. a) With necessary diagrams, explain the working principle of an Compression Ignition [CI] engine in which crankshaft makes two revolutions to complete one cycle. CO2 (10)
b) The following observations were obtained during a trial on four stroke diesel engine. Cylinder diameter= 30cm ,stroke of the piston=55cm, crank shaft speed=300rpm, brake load=80kg, Brake drum diameter =1.8m , mean effective pressure=8 Bar , diesel consumption is 0.1 liter / minute , specific gravity of Diesel=0.78, calorific value of Diesel=43,000 KJ/Kg. Find Brake power, Indicated Power, Frictional power, mechanical efficiency, frictional power, Mechanical efficiency, brake thermal efficiency and Indicated thermal efficiency. CO2 (10)
4. a) With a neat sketch, explain the working principle of vapor compression refrigeration system. CO2 (08)
b) Explain the desirable properties of a good refrigerant. CO2 (06)
c) What are the advantages of Vapor absorption refrigeration system over vapor compression refrigeration system? CO2 (06)



UNIT - III

5. a) Define lathe. Give the classification of lathe. CO3 (06)
- b) Name the type of machine tool used for the following operations: CO3 (06)
- i) Turning ii) Reaming iii) Knurling
- iv) Spot facing v) Straddle milling vi) Flat surface finishing
- c) Explain the working of milling machine used for slot milling. CO3 (08)
6. a) With neat sketch, give the comparison between conventional milling and climb milling. CO3 (06)
- b) Explain the grinding machine, which is used for grinding external cylindrical surface. CO3 (06)
- c) Explain the construction and working of sensitive drilling machine. CO3 (08)

UNIT - IV

7. a) How do you classify welding? Give examples. CO4 (05)
- b) Compare AC and DC welding. CO4 (08)
- c) Distinguish between soldering and brazing. CO4 (07)
8. a) Write a note on CNC machines. CO4 (04)
- b) Differentiate between open and closed loop NC-system with sketches. CO4 (08)
- c) Differentiate between sliding contact and rolling contact bearing. CO4 (08)

UNIT-V

9. a) Derive an expression for Length of belt for open belt drive. CO5 (08)
- b) Sketch and explain the following gear drives. CO5 (08)
- i) Reverted gear Train ii) Rack and Pinion drive.
- c) In a cross belt drive the difference in tension between tight side and slack side of the belt is 1000N. find the tension on slack slide and tight side, if the angle of contact is 160° CO5 (04)
10. a) List out the desirable properties of a Good Lubricant. CO5 (04)
- b) With neat sketch explain the following: CO5 (10)
- i) Needle type Lubricator ii) Splash lubricator
- c) 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. CO5 (06)



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ME101/ME201

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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

MAKE UP EXAMINATIONS – JUNE/JULY 2016

Course & Branch : B.E. – Common to All Branches

Semester : I/II

Subject : Elements of Mechanical Engineering

Max. Marks : 100

Subject Code : ME101/ME201

Duration : 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) Sketch and explain OTEC. CO1 (06)

b) What are the various Non-conventional energy resources available? With a neat sketch explain Geothermal power production. CO1 (08)

c) Define the following:

i) Internal Latent heat	ii) Latent heat of evaporation	CO1 (04)
iii) Dryness fraction	iv) Enthalpy of Superheated steam	

2. a) What is Compounding? With neat sketch explain Velocity Compounding. CO1 (08)

b) How are water turbines classified? With a neat sketch explain the working of Francis turbine. CO1 (12)

UNIT - II

3. a) Give the comparison between SI engine and CI engine. CO2 (06)

b) The following data are collected from four stroke, single cylinder oil engine running at full load. Bore = 200mm, stroke = 280mm, speed = 300rpm, indicated mean effective pressure = 5.6 bar, torque on the brake drum = 250N-m, oil consumed = 4.2 kg/hr, calorific value of oil used = 41000 kJ/kg. Determine the mechanical efficiency, indicated thermal efficiency and brake thermal efficiency.

c) With neat sketch, explain the working of refrigerating system which works on the principle of heat energy. CO2 (06)

4. a) Define refrigeration. Explain the basic parts of a refrigerator. CO2 (06)

b) Define refrigerant. What are the desirable properties of good refrigerant. CO2 (06)

c) With the help of P-V diagram, explain the four stroke petrol engine. CO2 (08)



UNIT - III

5. a) Sketch and explain the working of a Engine Lathe. CO3 (10)
b) Sketch and Explain the following lathe operations : CO3 (04)
 i) Knurling ii) Thread cutting
c) Differentiate between: CO3 (06)
 i) Boring and reaming ii) Counter sinking and counter boring
 ii) Turning and facing
6. a) Explain with neat sketch Cylindrical grinding. CO3 (08)
b) List out different milling operations and explain any two with neat sketches. CO3 (08)
c) Explain any two types of bonding materials used in grinding wheel. CO3 (04)

UNIT - IV

7. a) What are the advantages and disadvantages of CNC machines. CO4 (06)
b) Give the comparison between welding and soldering. CO4 (06)
c) How do you classify the welding process? With help of neat sketch, CO4 (08)
explain the working of electric arc welding process.
8. a) What is a bearing? How are they classified? CO4 (06)
b) Explain the tapered roller bearing. CO4 (06)
c) Name the different types of flames used in oxy acetylene welding CO4 (08)
process and explain them with neat sketches.

UNIT - V

9. a) Derive an expression for ratio of belt tensions in a flat belt drive. CO5 (10)
b) In an open belt drive, the driver and driver pulleys are 800 mm and 400 mm diameter respectively of maximum tension is 0.6 KN and coefficient of friction is 0.3 velocity is 4.5 m/sec, centre distance between the 2 pulleys are 1200 mm, find the power transmitted. CO5 (06)
c) What do you understand by idler pulley. CO5 (04)
10. a) In a compound gear train of wheels A, B, C and D have 15, 30, 20 and 40 teeth respectively. The wheels B and C are keyed to the same spindle. If the wheel A runs at 400 rpm, find the speed of wheel D. CO5 (10)
Sketch the arrangement if B meshes with A and C meshes with D.
b) With a neat sketch explain:
 i) Wick feed lubricator ii) Needle lubricator CO5 (10)


SEMESTER END EXAMINATIONS – JANUARY 2020

Program	: B.E. : Common to all Programs	Semester	: I/II
Course Name	: Elements of Mechanical Engineering	Max. Marks	: 100
Course Code	: ME13/ME23	Duration	: 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table is permitted.

UNIT- I

1. a) Enlist the differences with neat sketch of working principle between fire tube and water tube boilers. CO1 (04)
- b) Name, Draw a neat sketch of fire tube boiler and label its parts. CO1 (08)
- c) A steam initially will be at 9 bar and dryness fraction 0.98. Find the final quality and temperature of the steam at each of the following operations. (i) When steam loses 50 kJ/kg at constant pressure
(ii) when steam receives 150 kJ/kg at constant pressure.
Assume – $C_{PS} = 2.25 \text{ kJ/kgK}$, $C_{PW} = 4.187 \text{ kJ/kgK}$. CO1 (08)
2. a) What is compounding of impulse turbine? Name the method different method of compounding. CO1 (04)
- b) With neat sketch explain the working of high head water turbine. CO1 (08)
- c) With neat sketch explain working and the differences between impulse and impulse-reaction turbine. CO1 (08)

UNIT- II

3. a) Explain with a neat sketch the working of vapour compression refrigerator. CO2 (08)
- b) Classify Internal Combustion engines. CO2 (06)
- c) List and Explain the properties of good refrigerant. CO2 (06)
4. a) Compare two stroke engines with four stroke engines. CO2 (06)
- b) A four-stroke single cylinder diesel engine has the following observations. BP=75KW, brake thermal efficiency 35%, mechanical efficiency 90%, calorific value 40,000 KJ/Kg. Calculate indicated power, friction power, fuel consumption per BP hour. CO2 (06)
- c) Explain window air conditioner along with its advantages. CO2 (08)

UNIT- III

5. a) Explain the following lathe operations:
(i) Parting (ii) Thread cutting. CO3 (06)
- b) With a line diagram highlight the specifications of Lathe. CO3 (06)
- c) Briefly explain with the neat sketch the parts of a radial drilling machine. CO3 (08)

ME13/ME23

6. a) Explain the following operations that are carried on drilling machine: CO3 (08)
(i) Boring (ii) Counter boring (iii) Reaming (iv) Tapping.
b) Explain the different parts of an horizontal milling machine with a sketch. CO3 (08)
c) What is up milling and down milling? CO3 (04)

UNIT- IV

7. a) Briefly explain the basis of designating the coordinate axes in CNC machine tools. CO4 (10)
b) Differentiate between soldering and brazing. CO4 (04)
c) Explain with neat sketch of about the principle of arc welding. CO4 (06)
8. a) Mention the different types of oxyacetylene flames. Explain the application of each one of them. CO4 (08)
b) Define composites. Explain their classification in detail. CO4 (08)
c) Write a short note on electrodes used for arc welding. CO4 (04)

UNIT- V

9. a) Derive an expression for length of belt in an open drive system. CO5 (10)
b) State the advantages of V-belts over flat belts. CO5 (05)
c) Find the power transmitted by a belt running over a pulley of 600mm diameter at 200rpm. The coefficient of friction between belt and pulley is 0.25, angle of lap=160° and maximum tension in belt is 2500N. CO5 (05)
10. a) Derive an expression for the ratio of tensions for a flat belt drive. CO5 (10)
b) Define the following in spur gears:
 i) Pitch circle ii) Module iii) Addendum iv) Dedendum. CO5 (04)
c) Differentiate between belt drives and gear drives. CO5 (06)

SEMESTER END EXAMINATIONS – JANUARY 2020

Program	: B.E. : Common to all Programs	Semester	: I/II
Course Name	: Elements of Mechanical Engineering	Max. Marks	: 100
Course Code	: ME101/201	Duration	: 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non programmable calculator and Steam tables are allowed.

UNIT- I

1. a) Differentiate between conventional and Non-conventional energy sourcesses with suitable examples. CO1 (06)
- b) Explain with neat sketch working of Kaplan turbine. CO1 (10)
- c) List out boilers Mountings and accessories. CO1 (04)
2. a) Determine the amount of heat supplied to convert 10 kg wet steam of dryness fraction of 0.85 passes from a boiler to a super heater at a constant pressure of 1.5 Bar abs and super-heated temperature of 150°C. The specific heat of superheated steam is $C_{ps} = 2.25\text{Kj/kg K}$. CO1 (06)
- b) Draw a neat sketch Explain working principle of closed cycle gas turbine. CO1 (08)
- c) What is compounding of steam turbines? With neat sketch explain in brief any one type of compounding. CO1 (06)

UNIT- II

3. a) Explain the working of 4-stroke SI engine with a neat sketch and also draw PV diagram. CO2 (10)
- b) A two stroke engine has a piston diameter of 200 mm and a stroke of 300 mm. It has mean effective pressure of 2.8 bar and a speed of 400 rpm. The diameter of the brake drum is 1 meter and the effective brake load is 64 kg. Find the indicated power, the brake power, the mechanical efficiency of the engine and average piston speed. CO2 (10)
4. a) List the properties of good refrigerant. With a neat sketch explain vapor absorption refrigeration system. CO2 (10)
- b) Define the followings: i) Ton of Refrigeration ii) Refrigeration effect iii) Mean effective pressure iv) Bore v) Stroke vi) Top Dead Center vii) COP viii) Ice making capacity ix) Relative COP x) Indicated power. CO2 (10)

UNIT- III

5. a) With a neat Sketch explain the working principle of a Centre Lathe. CO3 (05)
- b) Explain with neat sketches the following lathe operations:
i. Taper Tuning ii. Thread cutting iii. Knurling. CO3 (15)
6. a) With neat sketch explain construction and working principle of bench drilling Machine. CO3 (10)
- b) Explain with neat sketch cylindrical type grinding machines. CO3 (10)

UNIT- IV

7. a) Explain NC and CNC machine with simple block diagram. CO4 (08)
b) Explain soldering. What fluxes are commonly used in soldering? Why the flux is necessary? CO4 (07)
c) List any five advantages of Additive manufacturing process. CO4 (05)
8. a) With a neat sketch explain the operation of Oxyacetylene welding process. CO4 (08)
b) List the difference between NC and CNC machine. CO4 (07)
c) Explain working of journal bearing with a neat sketch. CO4 (05)

UNIT- V

9. a) Derive an expression for ratio of tension for an open flat belt drive system. CO5 (10)
c) A shaft running at 160 rpm is to drive another shaft at 250 rpm and to transmit 20KW. The coefficient of friction between the belt and the pulley is 0.25. The diameter of the smaller pulley is 0.6m and the distance between the shaft centers is 2.75m . Determine the Length of belt, tight side and slack side tension in i) open belt ii) cross belt connecting the two pulleys .
10. b) With neat Sketch explain:
i) Stepped cone pulley drive. ii) The tight and loose pulley drive. CO5 (08)
b) A compound gear train consists of 4 gears, A, B, C and D and they have 40,60,80 and 90 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 120 rpm, find the rotational speed of gear D. CO5 (06)
c) With neat sketch explain splash lubrication system. CO5 (06)

SEMESTER END EXAMINATIONS – JUNE 2019

Course & Branch :	B.E. : Common to all Branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME13/ME23	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non-Programmable calculator and steam tables are allowed

UNIT-I

1. a) Explain the working of a Babcock and Wilcox boiler with neat labeled sketch. CO1 (10)
- b) Determine the total heat content per unit mass at the following state using the steam tables. Assume $C_p = 2.0934 \text{ kJ/kgK}$.
 - i) 10 bar and 300°C.
 - ii) 100 kPa and 250°C.
 - iii) Dry steam at 100 kPa.
 - iv) Steam at 12bar and 95%dry.
2. a) Enlist the differences between Impulsive and reaction water turbines. CO1 (10)
- b) Define Compounding and explain any two methods of compounding. CO1 (10)

UNIT-II

3. a) Give the comparisons between 4 stroke and 2 stroke engines. CO2 (04)
- b) With a neat sketch, explain the working of 4 stroke engine, which will give more mileage. CO2 (08)
- c) A person conducted a test on a single cylinder two stroke petrol engine and found that the mechanical and brake thermal efficiencies of the engine were 0.7 and 0.2 respectively. The engine with a mean effective pressure of 6 bar ran at 300 rev/min consuming fuel at a rate of 2.2 kg/hour. Given that the calorific value of the fuel is 42500 kJ/kg and that the stroke to bore ratio of the engine cylinder is 1.2. Find the bore, stroke of the engine in cm and speed of the piston. CO2 (08)
4. a) (i) What will happen if we use diesel in a petrol engine? Explain CO2 (04)
(ii) Why thermal efficiency of 4 stroke engine is more than 2 stroke engine?
- b) What are the desirable properties of a good refrigerant? CO2 (08)
- c) With a schematic diagram explain the working of a vapour compression window type room air conditioner. CO2 (08)

UNIT-III

5. a) Explain with neat sketches of the following operations related to lathe.
 - i) Thread Cutting ii) KnurlingCO3 (08)
- b) Draw a neat diagram of a horizontal milling machine. State the function of each of the part CO3 (08)
- c) List out the operation that can be performed using drilling machine. CO3 (04)

ME13/ME23

6. a) List out the six differences between lathe and milling machines. CO3 (06)
b) How are counter sinking and counter boring operation done on a drilling machine? Explain with suitable sketches. CO3 (08)
c) With suitable sketches differentiate between up milling and down milling. CO3 (06)

UNIT-IV

7. a) What are the advantages and disadvantages of CNC machines? CO4 (06)
b) With sketches explain the three types of oxy-acetylene flames. CO4 (06)
c) Define: (i) Soldering & (ii) Brazing. CO4 (04)
d) What are the advantages and disadvantages of Composites? CO4 (04)
8. a) Explain NC and CNC machines with simple block diagrams. CO4 (08)
b) Differentiate between soldering and brazing. CO4 (06)
c) Briefly explain the role of matrix and reinforcements in composites. CO4 (06)

UNIT-V

9. a) Explain with neat sketch
i) Stepped cone pulley ii) Open and cross belt drives CO5 (10)
b) Explain with neat sketch i) Spur gear ii) Rack and Pinion. CO5 (06)
c) A simple gear train consists of three gears. The number of teeth on the driving gear is 60 and on the idler is 40 and on the driven gear is 80. Find the velocity ratio, if the driving gear rotates at 1200 rpm. Calculate the speed of the driven gear. CO5 (04)
10. a) List and explain briefly the various power transmitting elements. CO5 (05)
b) In a belt drive the ratio of tensions is 2.0 and the slack side tension is 500 N. If the speed and diameter of the driven pulley are 200 rpm and 120 cm respectively, find the power transmitted. CO5 (04)
c) Explain with sketch worm gear and Bevel gear CO5 (06)
d) 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. Gear P is connected to the driving shaft and gear S connected to the driven shaft and power is transmitted. The details of the gears are CO5 (05)

Gear	P	Q	R	S
No. of teeth	30	60	40	80

if the gear S were to rotate at 60 rpm, calculate the speed of gear P. Show the arrangement of gears.



MAKEUP EXAMINATIONS - JULY 2019

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME23	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Non-Programmable calculator and steam tables are allowed.

UNIT- I

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|-------|---|-----|------|
| 1. a) | Draw the temperature - enthalpy diagram for a constant pressure heating process to represent the different status of a steam. | CO1 | (06) |
| b) | Sketch and explain the working of a Pelton turbine. | CO1 | (08) |
| c) | Differentiate between open and closed cycle gas turbines. | CO1 | (06) |
| 2. a) | Explain with a neat sketch the working of reaction water turbine. | CO1 | (08) |
| b) | Explain with a neat sketch of closed cycle gas turbine. | CO1 | (06) |
| c) | A steam initially will be at 9 bar and dryness fraction 0.98. Find the final quality and temperature of the steam when it loses 50 kJ/Kg at constant pressures. | CO1 | (06) |

UNIT- II

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|-------|--|-----|------|
| 3. a) | With a neat sketch, Explain the working of two stroke SI engine. | CO2 | (08) |
| b) | The following observations were recorded during a test on a 4-stroke engine. Bore=0.25m,stroke=40cm, crank speed=250rpm,Net load on the brake drum =700N,Diameter of the brake drum=2m, Indicated mean effective pressure =6bar,Fuel consumption=0.1lit/min, specific gravity of fuel =0.78,Calorific value of fuel is 43900kJ/kg. Determine brake power, indicated power, Friction power, Mechanical efficiency and Indicated and brake thermal efficiency. | CO2 | (12) |
| 4. a) | With a neat sketch explain the working of vapour absorption refrigeration system. | CO2 | (10) |
| b) | Name the different types of refrigerants and explain any two. | CO2 | (05) |
| c) | List the differences between SI and CI engine. | CO2 | (05) |

UNIT- III

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|-------|--|-----|------|
| 5. a) | How do you specify the size of a lathe Machine? | CO3 | (04) |
| b) | With a neat sketch explain the following operations performed on a drilling machine (i) Tapping (ii) Counter sinking. | CO3 | (08) |
| c) | Draw a neat sketch of engine lathe, label its important parts. | CO3 | (08) |
| 6. a) | With a neat sketch explain the working of radial drilling machine. | CO3 | (08) |
| b) | With a neat sketch explain the working principle of following machines. (i) Lathe (ii) drilling machine (iii) milling machine. | CO3 | (12) |

UNIT- IV

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|-------|--|-----|------|
| 7. a) | Define welding process. How they are classified? Explain with examples. | CO4 | (06) |
| b) | Explain the different types of Flames obtained in Gas welding with their importance. | CO4 | (06) |
| c) | Differentiate clearly between brazing and soldering. | CO4 | (04) |
| d) | Differentiate between CNC and NC machines. | CO4 | (04) |

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|----|--|-----|------|
| 8. | a) With a neat sketch explain the working of electric arc welding. | CO4 | (08) |
| b) | Define composite material. Give the general classification of composite materials based on matrix and reinforcement materials. | CO4 | (06) |
| c) | List out the advantages , disadvantages and applications of composite materials. | CO4 | (06) |

UNIT- V

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|-----|---|-----|------|
| 9. | a) Explain how open and cross belt drives function? | CO5 | (05) |
| b) | Derive an expression for the ratio of belt tensions for a flat belt drive. | CO5 | (07) |
| c) | With neat sketch explain the spur gear terminology. | CO5 | (08) |
| 10. | a) Explain stepped cone pulley with a line diagram. | CO5 | (06) |
| b) | Derive an expression for velocity ratio of a simple gear train. | CO5 | (06) |
| c) | Write a note on rack and pinion. | CO5 | (04) |
| d) | A compound gear train consists of four gears A, B, C & D and they have 15, 30, 20 & 40 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 400 rpm, find the speed of gear D. Show the arrangement of gears. | CO5 | (04) |

**SEMESTER END EXAMINATIONS – JUNE 2019**

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table is permitted

UNIT- I

1. a) Define the following: CO1 (04)
i) Internal Latent heat ii) Latent heat of evaporation
iii) Dryness fraction iv) Enthalpy of Superheated steam.
- b) What are the various Non-conventional energy resources available? CO1 (10)
With a neat sketch explain Geothermal power production.
- c) Find the total heat when water at 20°C is heated at constant pressure CO1 (06)
of 2.5bar absolute and evaporated into steam with a dryness fraction 0.85.
2. a) What is Compounding? With neat sketch explain Velocity CO1 (07)
Compounding.
- b) How are water turbines classified? With a neat sketch explain the CO1 (09)
working of Francis turbine.
- c) 7kg of wet steam contains 0.46kg of water particles in it. What is the CO1 (04)
dryness fraction of the steam?

UNIT- II

3. a) Give the comparisons between 4 stroke and 2 stroke engines. CO2 (04)
b) With a neat sketch, explain the working of 4 stroke diesel engine. CO2 (08)
c) For a diesel cycle engine, the following data is given bore=25 mm, CO2 (08)
stroke length = 40mm, crank speed= 250 rpm, net load on brake
drum= 700N, diameter of brake drum = 2m, Indicated M.E.P = 6 bar,
fuel consumption = 0.0013 kg/s, Calorific value of fuel = 43900 KJ/kg.
Determine (i) Indicated power (ii) Brake power (iii) Friction power
(iv) Mechanical efficiency (v) Indicated thermal efficiency (vi) brake
thermal efficiency (vii) ISFC & BSFC.
4. a) (i) What will happen if we use diesel in a petrol engine? Describe CO2 (04)
briefly
(ii) Discuss briefly Why thermal efficiency of 4 stroke engine is more
than 2 stroke engine?
- b) List down the desirable properties of a good refrigerant? CO2 (08)
c) With a schematic diagram explain the working of a vapour compression CO2 (08)
refrigeration system.

UNIT- III

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|----|---|-----|------|
| 5. | a) List out various methods of taper turning on a lathe? With neat sketch
explain any one method of taper Turning. | CO3 | (08) |
| b) | Explain with a neat sketch radial drilling machine. | CO3 | (08) |
| c) | What are the different operations performed on a Milling Machine. | CO3 | (04) |
| 6. | a) Explain with neat sketches i)Up milling ii)Down milling. | CO3 | (06) |
| b) | Draw a neat sketch and explain Horizontal milling machines and label its parts. | CO3 | (08) |
| c) | Distinguish between cylindrical grinding and surface grinding. | CO3 | (06) |

UNIT- IV

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|----|--|-----|------|
| 7. | a) What are the advantages & disadvantages of CNC machines? | CO4 | (04) |
| b) | Give the comparison between soldering and brazing. | CO4 | (08) |
| c) | Explain with a neat figure, the different types of flames in oxyacetylene gas welding. | CO4 | (08) |
| 8. | a) Classify the bearings. | CO4 | (04) |
| b) | With a neat sketch explain the working of arc welding. | CO4 | (08) |
| c) | Sketch and explain the working of ball bearing. | CO4 | (08) |

UNIT- V

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|-----|---|-----|------|
| 9. | a) Derive an expression for the ratio of belt tensions in the flat belt drive. | CO5 | (08) |
| b) | In a belt drive, the velocity ratio is 3. The driving pulley runs at 400rpm. The diameter of driven pulley is 30cm. Find the speed of the driven pulley and the diameter of the driving pulley. | CO5 | (06) |
| c) | Draw a neat sketches of a simple gear train in which both the driving and the driven wheels have to rotate in the same direction and derive an expression for the velocity ratio. | CO5 | (06) |
| 10. | a) What is gear train? Explain with neat sketch:
i) compound gear train ii) Reverted gear train. | CO5 | (08) |
| b) | Define the following:
i) Initial tension ii) Power in belt drive iii) Slip iv) Velocity ratio. | CO5 | (04) |
| c) | A compound gear train consists of four gears P, Q, R and S having 20, 40, 60 and 80 teeth respectively. The gear P is keyed to driving shaft. Gear S to driven shaft, Q and R are compound gears. The gear Q meshes with P and R meshes with S. If P rotates at 150rpm, what is the RPM of gear S? Show gear arrangement. | CO5 | (08) |

**MAKEUP EXAMINATIONS - JULY 2019**

Course & Branch :	B.E. : Mechanical Engineering	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Use of steam table is permitted

UNIT- I

1. a) What are the advantages and disadvantages of renewable and non-renewable energy sources CO1 (04)
- b) What is fire tube boiler? Draw a neat sketch of fire tube boiler and label the parts. CO1 (08)
- c) Calculate the enthalpy of 2 kg of steam at 12 bar, when the steam is at (i) dry saturated steam (ii) 22% wet steam (iii) super-heated steam at 250°C. Assume – $C_{PS} = 2.25 \text{ kJ/kgK}$, CO1 (08)
2. a) Broadly classify the water turbine with an example. CO1 (04)
- b) With a neat sketch explain the working of geothermal energy conversion system. CO1 (08)
- c) With a neat sketch explain working of pelton wheel turbine. CO1 (08)

UNIT- II

3. a) With P-V diagram, describe the working of four stroke diesel engine. CO2 (08)
- b) Define following: CO2 (04)
- | | |
|-------------------------|------------------------------|
| i) Brake Power | ii) SFC |
| iii) Thermal Efficiency | iv) Mean effective pressure. |
- c) The following are the details of a 4-Stroke petrol engine: CO2 (08)
Diameter of brake drum=60.00cm, Full brake load on drum=250N,
Brake drum speed=450rpm, Calorific value of petrol=40MJ/kg, Brake thermal efficiency=32%, mechanical efficiency=80%, specific gravity of petrol=0.82. determine:
i) brake power
ii) indicated power
iii) fuel consumption in litres per second
iv) Indicated thermal efficiency.
4. a) Differentiate clearly between SI and CI Engine CO2 (04)
- b) Briefly explain the properties of a good refrigerant. CO2 (06)
- c) Explain the principle of working of a window air conditioner with neat schematic diagram. CO2 (10)

UNIT- III

5. a) How do you specify the size of a lathe Machine? CO3 (04)
- b) With a neat sketch explain the following operations performed on a drilling machine (i) Reaming (ii) Counter sinking. CO3 (08)
- c) Draw a neat sketch of engine lathe, label its important parts. CO3 (08)
6. a) With a neat sketch explain the working of radial drilling machine. CO3 (08)
- b) With a neat sketch the following operations in a lathe machine. CO3 (12)
(i) Taper Turning (ii) Threading (iii) Knurling.

ME 101/201

UNIT- IV

7. a) Differentiate between consumable and Non-Consumable electrodes. CO4 (04)
b) With the help of necessary sketches explain the principle of Arc welding, Why are electrodes coated? Explain. CO4 (08)
c) Differentiate NC and CNC Machines. CO4 (04)
d) With a neat sketch explain Axis co-ordinate system. CO4 (04)

8. a) With neat sketches, indicate different flame formations in gas welding. CO4 (05)
b) Differentiate between sliding contact and rolling contact bearings. CO4 (06)
c) Differentiate between soldering and brazing. CO4 (04)
d) Sketch and describe the bushed bearing. CO4 (05)

UNIT- V

9. a) Derive an expression for length of belts for open belt drives. CO5 (06)
 b) Derive an expression for ratio of tension in belt drive. CO5 (06)
 c) In a compound gear train of wheels A, B, C and D have 20, 50, 25 and 75 teeth respectively. The wheels B & C are mounted on the same shaft. Wheel A gears with B, Wheel C gears with D. If the wheel A connected motor shaft and runs at 950 rpm in clockwise direction. sketch the arrangement and Find the speed of wheel D.

10. a) Explain the following terms with respect to belt drives: CO5 (04)
 (i) slip (ii) creep.
 b) With a neat sketch explain the followings with their applications: CO5 (08)
 (i) Spur gears (ii) Helical gears (iii) Bevel gears (iv) Worm gears.
 c) Draw a neat sketch of spur gear & mark the followings: CO5 (08)
 (i) pitch circle (ii) circular pitch
 (iii) tooth thickness (iv) width of space
 (v) addendum & addendum (vi) face width.

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SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY 2019

Course & Branch :	B.E. : Common to all branches	Semester :	I / II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME 13/ME 23	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Steam Tables are allowed.

UNIT- I

1. a) Draw a neat sketch of fire tube boiler and explain its working principle. CO1 (10)
b) 5kg of wet steam of dryness fraction 0.8, passes from a boiler to a superheater, at a constant pressure of 10 bar abs. In the superheater its temperature increases to 350°C. Determine its amount of heat supplied in the superheater. The specific heat of superheated steam Cps = 2.25 kJ/kg K. [At P = 10 bar abs, the properties from steam tables are : Ts = 179.88°C hf = 762.61 kJ/kg hfg = 2013.6 kJ/kg].
c) Define: (i) Sensible heat (ii) Latent heat (iii) Amount of superheat (iv) Enthalpy of dry steam. CO1 (04)
2. a) Define Compounding. With neat diagrams, explain the different methods of compounding. CO1 (10)
b) Sketch and explain the working of mixed flow water turbine. CO1 (10)

UNIT- II

3. a) Describe the working of a four stroke petrol engine with neat sketches and a p-v diagram. CO2 (10)
b) 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 = 2m, mean effective pressure = 6 bar, diesel oil consumption = 0.1 m³/min, specific gravity of oil = 0.78, calorific value of fuel = 43900 kJ/kg. Determine: (i) Brake power, (ii) Indicated power, (iii) Mechanical efficiency, (iv) Brake thermal efficiency & (v) Indicated thermal efficiency. CO2 (10)
4. a) Explain the working principle of vapour absorption refrigeration system with a neat sketch. CO2 (10)
b) Differentiate between vapour compression and vapour absorption refrigeration systems. CO2 (05)
c) List any ten desirable properties of an ideal refrigerant. CO2 (05)

UNIT- III

5. a) Explain any two drilling operations with neat sketches. CO3 (10)
b) With a neat sketch, explain the working principle of radial drilling machine. CO3 (10)
6. a) List the various milling operations and explain any two with neat sketches. CO3 (10)
b) Enlist the specifications of a lathe. CO3 (04)
c) With neat sketches explain any two taper turning methods. CO3 (06)

UNIT- IV

- | | | |
|----|---|----------|
| 7. | a) Define welding, explain in brief classification of welding. | CO4 (06) |
| | b) Explain in brief with neat sketches:
i. Principle of arc welding
ii. Brazing operations. | CO4 (08) |
| | c) Name the different types of gas flame and mention their applications. | CO4 (06) |
| 8. | a) What are composites? explain in brief classifications of composites. | CO4 (08) |
| | b) Give short notes on:
i. CNC Machine.
ii. NC Machine
iii. Open loop and close loop system. | CO4 (12) |

UNIT- V

- | | | |
|-----|---|----------|
| 9. | a) Explain with neat sketch:
i) Stepped cone pulley ii) Open and cross belt drives. | CO5 (10) |
| | b) Briefly explain the following gear drives with neat sketches.
i) Spur gear. iii) Worm gears | CO5 (05) |
| | c) Explain with sketch compound gear train. | CO5 (05) |
| 10. | a) Explain briefly the following with neat sketches.
i) Spur gear ii) Bevel gear iii) Rack and pinion. | CO5 (09) |
| | b) Enumerate the advantages and disadvantages of flat belt drive and V-belt drive. | CO5 (05) |
| | c) A compound gear train consists of 4 gears A, B, C and D having 20, 30, 40 and 60 teeth respectively. The gear A is keyed to drive shaft, gear D is keyed to driven shaft, B and C are the compound gears. B meshes with A and C meshes with D. If A rotates at 180 rpm, what is the speed of gear D. Sketch the arrangement. | CO5 (06) |


SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY 2019

Course & Branch :	B.E. : Common to all branches	Semester :	I/II
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME101/ME201	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

- a) Explain with neat sketch working of ocean thermal energy conversion system. CO1 (06)
b) Draw a neat sketch of water tube boiler and mark all important parts on it. CO1 (08)
c) A steam initially will be at 9 bar and dryness fraction 0.98. Find the quality and temperature of the steam at each of the following operations.
(i) When steam loses 50 kJ/kg at constant pressure.
(ii) When steam receives 150 kJ/kg at constant pressure.
Assume – $C_{PS} = 2.25 \text{ kJ/kgK}$, $C_{PW} = 4.187 \text{ kJ/kgK}$,
- a) What do you mean by compounding of impulse steam turbine? Explain velocity compounding with sketch of velocity and pressure diagrams. CO1 (08)
b) Give the comparison between open cycle and closed cycle gas turbine. CO1 (04)
c) With a neat sketch explain the working of high head water turbine. CO1 (08)

UNIT – II

- a) Give the comparisons between SI and CI engines. CO2 (04)
b) With a neat PV diagram, explain the working of 4-Stroke Otto cycle engine. CO2 (08)
c) A diesel engine develops 5kW. It's indicated thermal efficiency is 30% and mechanical efficiency 57%. Estimate the fuel consumption of engine in
(i) kg/hr (ii) Liters/hr (iii) ISFC (iv) BSFC
Assume: Density of diesel = 0.832 kg/l, CV of diesel = 44800kJ/kg
- a) What are the desirable properties of a good refrigerant? CO2 (06)
b) Why the freezers are usually kept at top portion of the single door domestic refrigerators? CO2 (04)
c) With a schematic diagram explain the working of a window type room air conditioner which works on electrical energy. CO2 (10)

UNIT – III

- a) Draw a neat sketch of engine lathe. How the lathes are specified? CO3 (10)
b) With a neat sketch explain the following operations that can be performed on a drilling machine (i) Tapping (ii) Counter sinking (iii) Reaming
c) With neat sketch give the comparison between conventional and climb milling. CO3 (04)
- a) With a neat sketch explain the working of cylindrical grinding machine. CO3 (08)
b) With a neat sketch explain the following operations that can be performed on a milling machine (i) End milling (ii) Slot milling (iii) Form milling.
c) With a neat sketch explain the working principle of following machines.
(i) Lathe (ii) Drilling machine. CO3 (06)

ME101/ME201

UNIT – IV

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|----|--|-----|------|
| 7. | a) Define temporary and permanent joints. Give examples for each. | CO4 | (05) |
| | b) Give comparison between soldering & brazing. | CO4 | (06) |
| | c) Explain with a neat sketch , the different types of flames in oxyacetylene gas welding. | CO4 | (09) |
| 8. | a) With a neat sketch explain the working of electric arc welding. | CO4 | (08) |
| | b) Explain the coordinate system of CNC machine with neat sketch. | CO4 | (08) |
| | c) What are the advantages & disadvantages of CNC machine? | CO4 | (04) |

UNIT – V

- | | | | |
|-----|---|-----|------|
| 9. | a) Derive an expression for length of flat belt for open belt drive. | CO5 | (08) |
| | b) In a compound gear train of wheels A, B, C, D, E and F and have 20, 50, 25, 75 25 and 65 teeth respectively. The wheels B & C and D & E are compound gear fixed to parallel shafts rotating together. Wheel A gears with B, Wheel C gears with D and Wheel E gears with F. Wheel F is fixed on the output shaft. If the wheel A is connected to motor shaft and runs at 950 rpm. sketch the arrangement and find the speed of wheel F. | CO5 | (08) |
| | c) Name the important properties of lubricant. | CO5 | (04) |
| 10. | a) Draw a neat sketch of spur gear and mark the followings:
(i) Pitch circle (ii) Circular pitch (iii) Tooth thickness (iv) Width of space (v) Addendum & dedendum (vi) Face width. | CO5 | (08) |
| | b) Find the power transmitted by a belt running over two pulley of diameters 600 mm at 200 rpm. The coefficient of friction between the belt and pulley is 0.25 and the maximum tension in the belt is 2500N. | CO5 | (04) |
| | c) Classify gear trains. Explain them with sketch. | CO5 | (08) |



SEMESTER END EXAMINATIONS – JANUARY 2019

Course & Branch	: B.E. : Common to all branches	Semester	: I
Subject	: Elements of Mechanical Engineering	Max. Marks	: 100
Subject Code	: ME13	Duration	: 3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Steam Tables and Non Programmable Calculator are allowed.

UNIT- I

1. a) Explain the working of Lancashire boiler with neat labeled sketch. CO1 (10)
b) With help of temperature-enthalpy diagram explain the mechanism of formation of steam at constant pressure. CO1 (10)
2. a) Sketch and explain Babcock and Wilcox boiler. CO1 (12)
b) Sketch and label Pelton Wheel and explain it's working CO1 (08)

UNIT- II

3. a) With necessary diagrams, explain the working principle of a Spark ignition [SI] engine in which crankshaft makes two revolutions to complete one cycle. CO2 (10)
b) The following observations were obtained during a test on four stroke diesel engine. Cylinder diameter= 250mm, stroke of the piston=40cm, crank shaft speed=250rpm, net brake drum load=700N, Brake drum diameter =2.0m, Indicated mean effective pressure=6bar, diesel consumption is 0.0013kg/s , specific gravity of Diesel=0.78, calorific value of Diesel=43,900 KJ/Kg. Find Brake power, Indicated Power, Frictional power, mechanical efficiency, Mechanical efficiency, brake thermal efficiency and Indicated thermal efficiency.
4. a) What is refrigerant? Explain in brief the desirable properties of refrigerant. CO2 (06)
b) Explain with a neat sketch the working principle of Vapor compression refrigeration systems. CO2 (08)
c) Explain the construction and working of a window air conditioner. CO2 (06)

UNIT- III

5. a) Explain with sketches the following Lathe operations.
i) Step turning ii) Facing. CO3 (06)
b) Explain with neat sketch bench drilling machine. CO3 (08)
c) Draw a neat diagram of a horizontal milling machine and label it. CO3 (06)
6. a) Explain the functions of the following in a centre lathe
i) Carriage assembly ii) chuck and tail stock. CO3 (04)
b) Draw sketches to illustrate the following operations performed on drilling machine: i) Boring ii) Reaming iii) Tapping
iv) Counter sinking v) Counter boring. CO3 (10)
c) With sketches explain the following milling operations:
i) Form Milling ii) Angular milling. CO3 (06)

UNIT- IV

7. a) Briefly explain the basis of designating the coordinate axes in CNC machine tools. CO4 (10)
b) With the help of necessary sketches explain the principle of arc welding. CO4 (06)
c) Write a short notes on electrodes used for arc welding. CO4 (04)
8. a) Define Composites. Explain their classification in detail. CO4 (08)
b) Name the three types of oxyacetylene flames. Explain the application of each one of them. CO4 (08)
c) Differentiate between soldering and brazing. CO4 (04)

UNIT- V

9. a) Derive an expression for the ratio of belt tensions for a flat belt drive with usual notations. CO5 (08)
b) A shaft running at 160 rpm is to drive another shaft at 250 rpm by open belt drive. The distance between the shafts is 2.75 m and the smaller pulley is 600 mm in diameter. Determine the length of belt. Also find the necessary length of belt to alter the direction of rotation of the driven shaft without altering the driving shaft diameter. CO5 (06)
c) Define the following: (i) Pitch circle diameter, (ii) Circular pitch, (iii) Module, (iv) Addendum, (v) Dedendum. CO5 (06)
10. a) Explain the following with line diagrams:
(i) Stepped pulley (ii) Idler pulley. CO5 (08)
b) What is simple gear train? Derive an expression for velocity ratio of a simple gear train consisting of four gears. CO5 (08)
c) A compound gear train consists of four gears A, B, C & D and they have 20, 30, 40 & 60 teeth respectively. Gear 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. Show the arrangement of gears. If A rotates at 180 rpm, find the speed of gear D. CO5 (04)



MAKEUP EXAMINATIONS – FEBRUARY 2019

Course & Branch :	B.E. : Common to all branches	Semester :	I
Subject :	Elements of Mechanical Engineering	Max. Marks :	100
Subject Code :	ME13	Duration :	3 Hrs

Instructions to the Candidates:

- Answer one full question from each unit.
- Steam Tables and Non Programmable Calculator are allowed.

UNIT- I

1. a) Explain the formation of steam starting from ice with T-H diagram. CO1 (08)
b) With a neat sketch explain the construction and working of a closed cycle gas turbine. CO1 (07)
c) What is the enthalpy of 5kg of steam under the following condition: CO1 (05)
 - 0.8bar absolute and 90% dry
 - 20bar absolute and 300C
Specific heat of superheated steam is 2.25kJ/kgK.
2. a) Define the following with reference to steam: CO1 (06)
 - Dryness fraction
 - Enthalpy
 - Latent heat
 - Internal energy
 - Specific volume
 - Super heat.
b) Explain with a neat sketch High head hydraulic turbine CO1 (06)
c) A steam initially will be at 9bar and dryness 0.98. Find the final quality and temperature of the steam at each of the following operations: CO1 (08)
 - When the steam loses 50 kJ/kg at constant pressure
 - When the steam receives 150 kJ/kg at constant pressure.

UNIT- II

3. a) With necessary diagrams, explain the working of 4 stroke compression ignition engine. CO2 (10)
b) A single cylinder 4 stroke engine runs at 1000 rpm and has a bore of 115mm and a stroke of 140mm. The brake load is 60N at 600mm radius and the mechanical efficiency is 80%. Calculate brake power and mean effective pressure. CO2 (10)
4. a) Define the following performance parameters: CO2 (10)
 - Brake power
 - Indicated power
 - Brake thermal efficiency
 - Brake specific fuel consumption
 - Mechanical efficiency.
b) With neat diagram, explain the working of a refrigerator that uses ammonia as the refrigerant. CO2 (10)

UNIT- III

5. a) Explain with a neat diagram the construction of an engine Lathe. CO3 (12)
b) Explain the following drilling operations with neat sketches: CO3 (08)
 - Counterboring
 - Reaming.

ME 13

6. a) Explain the working principle of radial drilling machine with a neat sketch. CO3 (07)
b) Sketch and explain the working principle of horizontal spindle milling machine. CO3 (08)
c) With sketches explain the following milling operations:
(i) Angular milling (ii) Slot milling. CO3 (05)

UNIT- IV

7. a) Explain the working principle of electric arc welding process with a neat sketch. CO4 (10)
b) State the advantages and applications of CNC machine. CO4 (06)
c) Define soldering and brazing. CO4 (04)
8. a) Describe the two types of electrodes used in arc welding. CO4 (06)
b) With the help of relevant sketch explain oxy acetylene welding. CO4 (08)
c) Enlist the advantages and applications of metal matrix composites. CO4 (06)

UNIT- V

9. a) Derive an expression for Length of belt for open belt drive. CO5 (08)
b) Sketch and explain the spur gear profile with related terminology. CO5 (06)
c) A leather belt transmits 20KW power from a pulley of 750mm diameter which runs at 500RPM. The belt is in contact with the pulley over an arc of 160° .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.
10. a) With neat sketch explain the following:
i) Stepped cone pulley drive
ii) compound gear Train. CO5 (12)
- 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. CO5 (08)
