ME19405/ME19R405

EVEN 2025-26

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Tool Engineering**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State any four cutting tool materials. **[CO-1, L-R]**
b. Name different types of cutting fluids. **[CO-1, L-R]**
c. Define i) Chip thickness ratio, ii) Machinability. **[CO-2, L-R]**
d. State Taylor's equation for tool life; Name various terms used in it. **[CO-2, L-R]**
e. Differentiate between Upmilling and Downmilling (two points each). **[CO3-, L-R]**
f. State the importance of face and flank in twist drill nomenclature. **[CO-3, L-R]**
g. "Clearance is essential between punch and die in press tool work" state true or false, and justify your answer **[CO-4, L-U]**
h. Define- i) Jigs
ii) Fixtures **[CO-5, L-R]**
i. Name the various materials used for manufacturing of forging dies. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. List desired properties of cutting tool materials. **[CO-1, L-R]**
b. Draw merchant's circle diagram showing various forces involved in cutting process. **[CO-2, L-U]**
c. Tungsten carbide insert is designated as T N M G 20 04 12 identify the parameters of the insert. **[CO-3, L-A]**
d. Enlist different defects in drawing operation and suggest the remedies for the same. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. List the safety precautions to be followed in press tool working. **[CO-4, L-A]**
b. Explain 3-2-1 principle of location of workpiece with neat sketch. **[CO-5, L-R]**
c. State the advantages and limitation of forging. **[CO-6, L-R]**
d. Explain the factors to be considered while designing a forging dies. **[CO-6, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. A washer of 30mm internal diameter and 60 mm external diameter having a thickness of 2mm is to be cut from Aluminium strip having shear strength of 150N/mm^2 . Determine the cutting force required. **[CO-4, L-A]**

b. Explain the use of diamond pin locator with sketch. **[CO-5, L-U]**

c. Explain fluidized be fixtures. **[CO-5, L-U]**

d. What is fool proofing of jigs and fixture ? State it's significance. **[CO-5, L-U]**

e. Draw a neat sketch of forging die, showing important constructional features of it. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. State the functions of cutting fluid and explain the factors to be considered while selecting the cutting fluid. **[CO-1, L-R]**

b. Differentiate between orthogonal cutting and oblique cutting. **[CO-2, L-U]**

c. Draw neat sketch of single point cutting tool geometry, showing important elements and angles. **[CO-3, L-U]**

****End****

EVEN 2025-26 ME19203/**ME19R203**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering**
Course Title : **Manufacturing Processes**

2:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Enlist parts of power press. **[CO-2, L-R]**
b. State how press are specified. **[CO-2, L-R]**
c. Define the term 'flux' used in welding. **[CO-3, L-R]**
d. State specification of lathe machine. **[CO-4, L-R]**
e. List down types of milling machine. **[CO-5, L-R]**
f. State classification of drilling machines. **[CO-5, L-R]**
g. State function of facing head. **[CO-4, L-R]**
h. Define dressing of grinding wheel. **[CO-6, L-R]**
i. State the needs of surface treatment. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain various zones in cupola furnace. **[CO-1, L-U]**
b. Differentiate between soldering and brazing process. **[CO-3, L-A]**
c. Explain following lathe machine operations with neat sketch (i) Facing (ii) Knurling **[CO-4, L-A]**
d. Explain galvanization process, with its applications. **[CO-6, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain working of jolt moulding machine with neat sketch. **[CO-1, L-U]**
b. Differentiate between up milling and down milling. **[CO-5, L-U]**
c. Explain nomenclature of twist drill with labelled diagram. **[CO-5, L-U]**
d. Explain safety precautions to be taken while working on boring machine. **[CO-4, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Describe drawing operation in press with diagram. **[CO-2, L-A]**
b. Differentiate between horizontal and vertical column and knee type milling machine. **[CO-5, L-A]**
c. Define following properties of moulding sand : (i) Flowability (ii) Collapsibility (iii) Adhesiveness **[CO-1, L-U]**
d. What is indexing? Explain simple indexing with example. **[CO-5, L-U]**
e. Define following terms of grinding wheel : (i) Abrasives (ii) Grade (iii) Structure. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. State the causes and remedies of following welding defects.
(i) Undercuts (ii) Incomplete penetration (iii) Weld cracking. **[CO-3, L-A]**

b. Explain single point cutting tool geometry with sketch. **[CO-4, L-U]**

c. Explain following drilling machine operations with diagram **[CO-5, L-U]**
(i) Reaming (ii) Countersinking (iii) Spot facing.

****End****

EVEN 2025-26 **ME19R310 / ME19310**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Metrology & Quality control**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define Least count. **[CO-1, L-R]**
b. List down the types of standards. **[CO-1, L-R]**
c. State any two applications of comparator. **[CO-2, L-R]**
d. List down various instruments for angle measurement. **[CO-3, L-R]**
e. Define Limits and Tolerance. **[CO-4, L-R]**
f. Define Parallelism and straightness. **[CO-4, L-R]**
g. State the meaning of Ra and CLA value in surface finish. **[CO-5, L-R]**
h. Define primary texture and secondary texture. **[CO-5, L-R]**
i. State the advantages of acceptance sampling. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the various sources of errors in measurement. **[CO-1, L-A]**
b. Explain construction and working of Sigma Comparator with neat sketch. **[CO-2, L-A]**
c. Explain the floating carriage micrometer with neat sketch. **[CO-3, L-U]**
d. Explain various techniques of qualitative analysis. **[CO-5, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Differentiate between accuracy and precision. **[CO-1, L-U]**
b. Explain slip gauges with neat sketch and also explain wringing of slip gauges. **[CO-2, L-U]**
c. Explain Talysurf roughness tester with neat sketch. **[CO-5, L-U]**
d. Draw O. C. curve and explain the Producer's risk and Consumer's risk. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Define Scietific metrology, industrial metrology and legal metrology. **[CO-1, L-U]**
b. State the requirements of good comparator. **[CO-2, L-U]**
c. Define major diameter, minor diameter and effective diameter. **[CO-3, L-U]**
d. State the Taylor's principle for gauge design. **[CO-4, L-U]**
e. Explain types of Inspection. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. An angle of 49^0 29' 18'' is to be developed using standard angle gauge set of 13 pieces. Calculate the angle gauges required. Draw the sketch of arrangement. Given set is [1^0, 3^0, 9^0, 27^0, 41^0], [1',3',9', 27'], [3", 6", 18", 30"] **[CO-3, L-A]**

b. Explain any three alignment test for lathe machine with neat sketch. **[CO-4, L-A]**

c. Explain the principles of TQM. **[CO-6, L-A]**

****End****

EVEN 2025-26 **ME19209/ME19R209**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Fundamental of Electrical & Electronics Engineering.**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State effects of electric current. **[CO-1, L-R]**
b. Differentiate between EMF and potential difference. **[CO-1, L-U]**
c. State: i) Lenz's Law ii) Flemings right hand rule. **[CO-1, L-R]**
d. Compare single phase and three phase transformer on any two points **[CO-2, L-R]**
e. Define- i) Voltage ratio
ii) Transformation ratio. **[CO-2, L-R]**
f. State the need of biasing. **[CO-5, L-U]**
g. State any two applications of transistor. **[CO-5, L-R]**
h. Draw symbol of relay. State one application of general purpose relay. **[CO-6, L-R]**
i. State two applications of TRIAC. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the construction and working principle of transformer with suitable diagram. **[CO-2, L-U]**

b. Explain the construction of 3Ø squirrel cage Induction Motor. **[CO-3, L-U]**

c. A 3Ø I.M. is wound for 4 pole and supplied from 50 Hz supply system. Calculate synchronous speed and speed of motor when slip is 4% . **[CO-9, L-A]**

d. Draw and explain construction of N-P-N transistor. **[CO-6, L-R]**

Q. 3 Attempt any THREE **12 Marks**

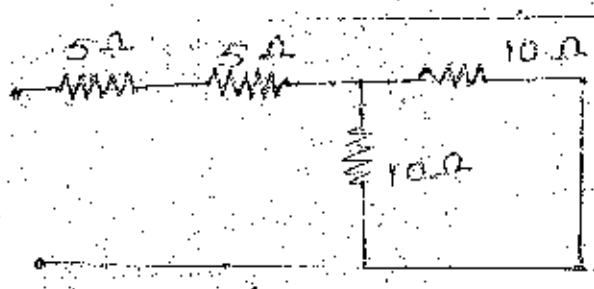
a. Calculate the equivalent resistance for circuit shown in fig 1 **[CO-1, L-A]**
b. Explain Active power, Reactive power and apparent power with power triangle. **[CO-1, L-A]**
c. Draw and explain reverse characteristics of zener diode. **[CO-4, L-R]**
d. Explain transistor as a switch with neat sketch. **[CO-4, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. State the relationship between voltage and current in pure inductance. **[CO-1, L-U]**
b. Give specification and application of transformer. **[CO-2, L-R]**
c. Draw a circuit of Pi filter and explain it. **[CO-4, L-U]**
d. Draw a pin diagram of 78XX IC voltage regulator. **[CO-5, L-U]**
e. Draw construction of DIAC and explain it. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Draw Torque – slip characteristics and state any four specifications of three phase induction motor. **[CO-3, L-R]**
b. Compare Half wave, Full wave and Bridge rectifier on the basis of wave form, efficiency, ripple and PIV. **[CO-4, L-A]**
c. Draw and explain block diagram of D. C. regulated power supply. **[CO-5, L-A]**



Q. 3 (a) Fig. 1

**** End ****

EVEN 2025-26

ME19302/ME19R302

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Industrial Hydraulics & Pneumatics**

2:30 Hours/ 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES; L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. List down limitations of hydraulic system. **[CO-1, L-R]**
b. Draw any two ISO symbols of pneumatic system. **[CO-1, L-R]**
c. Give the classification of pump. **[CO-2, L-R]**
d. State the function of control valve. **[CO-3, L-R]**
e. Draw symbol for FRL unit. **[CO-4, L-R]**
f. State the function of time delay valve. **[CO-4, L-R]**
g. State the purpose of sequencing circuit. **[CO-5, L-R]**
h. State the function of FRL unit. **[CO-4, L-R]**
i. Draw the symbol for double acting cylinder. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain general layout of oil Hydraulic system with neat sketch. **[CO-1, L-A]**
b. Explain Lobe pump with neat sketch. **[CO-2, L-U]**
c. Explain Rotary actuator with neat sketch. **[CO-3, L-U]**
d. Explain Double acting Reciprocation compressor with neat sketch. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain construction and working of Vane pump with neat sketch. **[CO-2, L-A]**
b. Explain remedies and fault detection in Hydraulic circuits. **[CO-5, L-U]**
c. Explain speed control circuit for D.A. air cylinders. **[CO-6, L-U]**
d. Explain direct control single acting air cylinder with neat sketch. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. List down practical applications of pneumatic system. **[CO-1, L-U]**
b. Explain types of oils used hydraulic system. **[CO-2, L-U]**
c. Sketch any three directional control valves. **[CO-3, L-U]**
d. Explain Shuttle valve in brief. **[CO-4, L-U]**
e. Draw Regenerative circuit with neat labeling. **[CO-5, L-U]**

Q. 5 **Attempt any TWO** **12 Marks**

a. Explain construction and working of pressure relief valve with neat sketch. **[CO-3, L-A]**

b. Explain Meter-out circuit (oil) with neat sketch. **[CO-5, L-A]**

c. Explain sequencing circuit (pneumatic) with neat sketch. **[CO-6, L-A]**

****End****

EVEN 2025-26 **ME19305/ME19R305**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **CNC Machines & Automation**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Classify CNC machines. **[CO-1, L-R]**
b. Define interpolation and work coordinate system related to CNC machines. **[CO-1, L-R]**
c. State functions of ATC in CNC machines. **[CO-2, L-R]**
d. Enlist any two type of spindle drives used in CNC machines. **[CO-2, L-R]**
e. State any four preparatory codes used for interpolation in CNC machines. **[CO-3, L-R]**
f. State types of tooling used in CNC machines. **[CO-4, L-R]**
g. State use of "one-time finding" diagnostic tool in CNC machines. **[CO-5, L-R]**
h. State types of automations. **[CO-6, L-R]**
i. What is need of automations? **[CO-6, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Explain construction and working of CNC machine with the help of suitable diagram. **[CO-1, L-U]**
b. State and explain application of machine control unit used in CNC machine. **[CO-2, L-A]**
c. Explain tool offset and tool wear compensation. **[CO-3, L-U]**
d. Explain types of indexable insert with its geometry. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Write any four causes and remedies for poor surface finish in CNC machining. **[CO-5, L-A]**
b. Explain how Industry 4.0 helps in achieving smart factories and automation. **[CO-6, L-A]**
c. Explain the feedback system used in CNC machine. **[CO-1, L-U]**
d. Which system you will apply for tool and pallet changing in CNC machine? Explain. **[CO-2, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain : i) Subroutines ii) Canned cycle. **[CO-3, L-U]**

b. Explain different fixtures used in CNC machines. **[CO-4, L-U]**

c. What are common mechanical and electrical problems in CNC machines. **[CO-5, L-A]**

d. Explain the role of PLC, sensors and feedback devices in an automated control system. **[CO-6, L-A]**

e. Explain working of swarf removal arrangement with neat sketch. **[CO-2, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain constructional details and working of ball screw and L.M guide ways with neat sketch. **[CO-2, L-U]**

b. Write and explain a CNC part program using preparatory G codes to mill a rectangular block of 60mm×40mm×5mm deep. **[CO-3, L-A]**

c. Explain with neat sketch how a tool magazine and ATC are integrated with the machine control unit of CNC. **[CO-4, L-A]**

****End****

EVEN 2025-26

ME19309/ME19R309

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Materials Technology**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L-LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define atomic packing factor. **[CO-1, L-R]**
b. State why FCC structured metals are softer than BCC metals? **[CO-1, L-R]**
c. Define allotropy. **[CO-2, L-R]**
d. State need of alloy steel. **[CO-3, L-R]**
e. State application of shape memory alloys. **[CO-3, L-A]**
f. State the limitations of ferrous material. **[CO-4, L-R]**
g. List down any two characteristics of bearing materials. **[CO-4, L-R]**
h. State purpose of nitriding process. **[CO-5, L-R]**
i. State advantages of ultrasonic crack detection test. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Classify crystal defects. Explain any two types of crystal defect in brief. **[CO-1, L-U]**
b. Estimate the hardness (BHN) and tensile strength (N/mm^2) for a plain carbon steel containing 0.6% carbon, considering the alloy contains only iron and carbon. **[CO-2, L-A]**
c. Explain the terms : Matrix and reinforcing materials with respect to composite materials. **[CO-3, L-U]**
d. Draw the micro structures and label phases of following alloys – i) 70:30 brass (cartridge brass) ii) 60:40 brass (Muntz metal). **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Differentiate between white cast iron and grey cast iron. **[CO-2, L-U]**
b. Explain TTT curve with its application. **[CO-5, L-U]**
c. Explain the procedure of Jominy end quench test for evaluation of hardenability of steel. **[CO-5, L-U]**
d. Explain the principle and procedure of radiography testing of materials. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain the process of preparing metallurgical sample for metallographic observations. **[CO-1, L-A]**

b. List down types and their compositions of stainless steel. **[CO-3, L-U]**

c. State properties and application of copper. **[CO-4, L-U]**

d. State the factors affecting on hardenability of steel. **[CO-5, L-U]**

e. Define creep. State the stages of creep development. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Draw neat Iron-Iron Carbide Equilibrium diagram indicating all important temperature, phases and composition. **[CO-2, L-U]**

b. i) State advantages and limitations of composite material. **[CO-3, L-U]**
ii)State applications of composite materials. **[CO-3, L-A]**

c. Explain the following processes of heat treatment with their objectives i) Normalizing ii) Annealing. **[CO-5, L-U]**

****End****

EVEN 2025-26

ME19406/ME19R406

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Mechanical Engineering (Sandwich Pattern)
Course Title : Industrial Maintenance

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L: LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define maintenance, also state its needs. **[CO-1, L-R]**
b. Define Reliability. **[CO-1, L-R]**
c. List down the equipments used in condition based maintenance. **[CO-2, L-R]**
d. State the benefits of TPM. **[CO-3, L-R]**
e. Enlist any four safety precautions can be taken in maintenance activities. **[CO-4, L-R]**
f. State norms for stock. **[CO-5, L-R]**
g. State the properties of lubricants. **[CO-5, L-R]**
h. Define work permit system. **[CO-6, L-R]**
i. State the purpose of history cards. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain i) Mean time between failure (MTBF)
ii) Mean time to repair (MTTR) **[CO-1, L-U]**
b. State classification of maintenance strategies and explain any one of them. **[CO-2, L-U]**
c. Explain the concept of 5S and its implementation in the total productive maintenance. **[CO-3, L-U]**
d. Enlist and explain common problems in hydraulic systems. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. State classification of spares. **[CO-5, L-U]**
b. Explain different methods of lubrication. **[CO-5, L-U]**
c. Explain how work order is prepared with an example. **[CO-6, L-A]**
d. Explain i) Defect analysis ii) Down time analysis **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. State objectives of maintenance department. **[CO-1, L-U]**
b. State and explain the factors considered in maintenance system design. **[CO-2, L-U]**
c. Explain energy saving through planned maintenance. **[CO-4, L-U]**

d. Explain maintenance schedule of pneumatic system. [CO-4, L-A]
e. Explain maintenance requisition procedure. [CO-6, L-U]

Q. 5 Attempt any TWO **12 Marks**

a. Define preventive maintenance. Explain preparation of maintenance and schedule for preventive maintenance in detail. [CO-2, L-A]

b. i) State philosophy of TPM.
ii) Explain six losses due to inferior maintenance. [CO-3, L-A]

c. Explain the maintenance of following devices in brief:
i) Flexing drives
ii) Air compressors
iii) Clutches [CO-4, L-U]

****End****

EVEN 2025-26

ME19304/ME19R304

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Power Engineering & Refrigeration & Air Conditioning**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L- LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Enlist the solid fuels used in rockets. **[CO-4, L-R]**
b. Define : Degree of saturation. **[CO-6, L-R]**
c. Name the material used for components i) Inlet valve ii) Crank shaft. **[CO-1, L-R]**
d. Enlist the functions of compressed air. **[CO-2, L-R]**
e. List the lubricants used in refrigeration. **[CO-5, L-R]**
f. List the assumptions used in air standard cycles. **[CO-1, L-R]**
g. State the types of nozzles used in steam turbines. **[CO-3, L-R]**
h. List the energy saving methods used in compressors. **[CO-2, L-R]**
i. State the role of star rating in air conditioners. **[CO-6, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. State the purpose of cooling tower and classify it. **[CO-3, L-U]**
b. Explain with neat sketch the working of vane type compressor. **[CO-2, L-R]**
c. Explain with neat sketch split air conditioner. **[CO-6, L-R]**
d. Explain with P-H diagram the effect of super heating on the performance of vapour compression cycle. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. State the purpose of HP cutout switch and explain its working. **[CO-5, L-U]**
b. Enlist the necessity of governing of steam turbine and describe throttle governing. **[CO-3, L-U]**
c. Represent brayton cycle on P-V and T-S diagram. Name the processes involved in it. **[CO-4, L-U]**
d. Define supercharging and list down its objectives. **[CO-1, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. List out major differences between BS4 and BS6 norms for four wheeler. **[CO-1, L-R]**

b. List refrigerants used for i) Water cooler ii) Ice plant iii) Cold storage. **[CO-5, L-R]**

c. List two application of i) Turbojet ii) Turboprop iii) Ramjet. **[CO-4, L-R]**

d. Explain pumping down of refrigerant during maintenance. **[CO-5, L-U]**

e. A single stage reciprocating compressor is reqtired to compress 1kg air from 1 bar to 4 bar, with initial temperature 27°C. Compare work required in i) Isothermal ii) Isentropic compression. **[CO-2, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. A petrol engine uses 0.272 kg fuel/KW of b.p/hr, with calorific value 43961KJ/KG, η_m=80%, compression ratio is 5.6. Calculate i) Brake thermal efficiency ii) Indicated thermal efficiency iii) Air standard efficiency. Take $\gamma = 1.4$. **[CO-1, L-A]**

b. List the causes and effects of following faults in refrigeration i) Evaporator coil icing. ii) Compressor trips frequently iii) Choked expansion valve. **[CO-6, L-A]**

c. 300kg beef is to be cooled from 25°C to -20°C in 6 hrs. Freezing occurs at -3°C. Specific heat before and after freezing is 3.224kj/kgk and 1.675 kj/kgk, COP=2.5. Determine required capacity and power required to run the compressor. **[CO-5, L-A]**

****End****

EVEN 2025-26

ME19205/ME19R205

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Basic Thermodynamics**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with a neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define a thermodynamic system. **[CO-1, L-R]**
b. Define quasi-static process. **[CO-1, L-R]**
c. State Gay-Lussac's law. **[CO-2, L-R]**
d. Define universal gas constant and state its value. **[CO-2, L-R]**
e. State law of conservation of energy. **[CO-4, L-R]**
f. State the concept of irreversibility. **[CO-4, L-R]**
g. Define dryness fraction. **[CO-5, L-R]**
h. List any four boiler mounting and their functions. **[CO-5, L-R]**
i. Define black body and grey body. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Compare open, closed and isolated systems. **[CO-1, L-A]**
b. 1kg of air at 1 bar and 27°c is held in a cylinder of $0.8m^3$ capacity. The gas is heated until the temperature becomes 216°c. Find the final pressure of an air in a cylinder and its density. Assume R = 287Nm/kgk. **[CO-2, L-A]**
c. Differentiate between isobaric and isochoric process. **[CO-3, L-A]**
d. Explain joule's experiment with a neat diagram to prove the first law of thermodynamics. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. 1kg of gas is heated in a constant volume tank having volume $V = 0.28m^3$ from initial pressure $P_1 = 4bar$. If heat energy Q = 82kj is supplied and the final temperature $T_2 = 128°c$. Find i) Work done ii) Change in internal energy iii) Specific heat at constant volume. Assume R = 300Nm/kgk. **[CO-3, L-A]**
b. Explain Kelvin Planck's and Clausius statement. **[CO-4, L-U]**
c. Compare fire tube & water tube boilers. **[CO-5, L-A]**
d. Explain the following terms related to radiation – i) Absorptivity ii) Emissivity. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain Zeroth law of thermodynamics with a suitable example. **[CO-1, L-U]**
b. State the assumption made for ideal gas. **[CO-2, L-A]**
c. State limitations of first law of thermodynamics. **[CO-4, L-U]**
d. State and explain uses of a steam. **[CO-5, L-A]**
e. Draw a neat labeled sketch of molier (H.S) diagram. Also state its uses. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain working of Lancashire boiler with neat sketch. **[CO-5, L-U]**
b. Explain modes of heat transfer with examples. **[CO-6, L-A]**
c. i) State classification of heat exchanger. **[CO-6, L-U]**
ii) Explain construction & working of plate type heat exchanger.

****End****

EVEN 2025-26 **ME19311/ME19R311**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Design Of Machine Elements**

3:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define fatigue. Give one example of fatigue failure in machine component. **[CO-1, L-R]**
b. Define the following terms i) Aesthetics ii) Ergonomics. **[CO-1, L-R]**
c. Why taper is provided to cotter? **[CO-2, L-R]**
d. Define coupling and clutch. **[CO-3, L-R]**
e. Write formula to design shaft on the basis of rigidity. **[CO-3, L-R]**
f. List down the advantages of screwed joints. **[CO-4, L-R]**
g. State the meaning of power screw. **[CO-5, L-R]**
h. State four properties desirable for a good spring material. **[CO-6, L-R]**
i. State any two functions of spring. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Write down steps involved in general design procedure. **[CO-1, L-U]**
b. State the various theories of elastic failure. Explain maximum distortion energy theory. **[CO-1, L-U]**
c. Differentiate between direct stress and bending stress. **[CO-2, L-U]**
d. For a square key prove that Fc=2fs where Fc=crushing strength & Fs=shearing strength. **[CO-3, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. What do you understand by bolt of uniform strength? Explain with neat sketch. **[CO-4, L-U]**
b. A wall bracket is attached to a wall by means of four bolts, two at a distance of 50mm from the lower edge and remaining two at a distance of 450mm from the lower bolts, it supports a load of 50KN at a distance of 500mm from the wall. Sketch arrangements and estimate the diameter of bolts. Assume working stress in tension as $80N/mm^2$. **[CO-4, L-A]**
c. Explain Wahl's correction factor for spring. Also explain its importance in the design of helical spring. **[CO-6, L-A]**
d. State types of profiles used in power transmission and also draw sketches of each. **[CO-5, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain terminology of screw thread with neat sketch. **[CO-4, L-U]**

b. Define i) Spring index ii) Spring stiffness iii) Free length of spring. **[CO-6, L-U]**

c. What are the advantages and disadvantages of square thread over 'V' threads? **[CO-5, L-U]**

d. What is self locking of screw? What are the conditions of self locking? **[CO-5, L-U]**

e. Differentiate between screw friction and collar friction. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Design a "C" clamp frame for a total clamping force of 20KN. The cross section of the frame is rectangular and width to thickness ratio is 2. The distance between load line and neutral axis of rectangular section is 12mm and gap between two faces is 180mm. The frame is made of cast steel. The permissible tensile stress for cast steel is $100N/mm^2$. **[CO-2, L-A]**

b. A shaft is required to transmit 1MW power at 240rpm. The shaft must not twist more than 1°on a length of one meter. If the modulus of rigidity for the material of the shaft is $80KN/mm^2$. Find diameter of shaft and shear stress induced in it. **[CO-3, L-A]**

c. Explain the classification of springs with neat sketch. **[CO-6, L-U]**

****End****

EVEN 2025-26

ME19402/ME19R402

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Automobile Engineering**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the function of carburetor. [CO-1, L-R]
b. State function of automobile chassis. [CO-1, L-R]
c. State the need of gear box. [CO-2, L-R]
d. Write function of suspension system. [CO-4, L-R]
e. List various components of air conditioning system in automobile. [CO-6, L-R]
f. State precautions necessary while using A. C. system in vehicle. [CO-6, L-R]
g. State function of battery. [CO-5, L-R]
h. State function of distributor. [CO-5, L-R]
i. State the function of charging system. [CO-5, L-R]

Q.2 Attempt any THREE **12 Marks**

a. State the advantage LPG and CNG operated engines. [CO-1, L-U]
b. Give classification of automobiles. [CO-1, L-U]
c. Explain with neat sketch working of simple carburetor. [CO-1, L-A]
d. State advantages and disadvantages of water cooling system. [CO-1, L-U]

Q. 3 Attempt any THREE **12 Marks**

a. Explain the working of single plate clutch with neat sketch. [CO-2, L-A]
b. Differentiate between disc brake and drum break. [CO-3, L-U]
c. Explain with neat sketch working of Rack and pinion type of steering gear system. [CO-3, L-A]
d. Draw layout of car AC system. Describe its working. [CO-6, L-A]

Q. 4 Attempt any FOUR **12 Marks**

a. Explain with neat sketch, Hotchkiss drive. [CO-2, L-A]
b. List the factors affecting tyre life. [CO-4, L-U]
c. Explain battery ignition system with neat sketch. [CO-5, L-A]
d. Explain with neat sketch Bendix drive. [CO-5, L-A]
e. State the working principle of alternator and write the difference between alternator and dynamo. [CO-5, L-U]

Q. 5 Attempt any TWO **12 Marks**

a. Describe with neat sketch working of constant mesh gear box. **[CO-2, L-A]**

b. Draw the layout of air- braking system. Explain its working. **[CO-3, L-U]**

c. Explain with neat sketch, working of telescope shock absorber. **[CO-4, L-A]**

****End****

EVEN 2025-26 **ME19202 / ME19R202**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **ME Engineering (Sandwich Pattern)**
Course Title : **Engineering Drawing-II**

3:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS.

Q.1 Attempt any THREE **18 Marks**

a. A square pyramid of 40mm edge of base and 60mm length of axis is resting in the H.P. on one of its base edges. The axis makes an angle of 30^0 with the HP. Draw its projection if the top view of an axis is inclined at 45^0 to the V.P. **[CO-1, L-A]**

b. A square prism side of base 30mm, axis height 50mm has its base in the HP with its two side of base parallel to V.P. It is cut by an auxiliary inclined plane (AIP) which bisects the axis and makes an angle of 45^0 the H.P. Draw projections of F.V., sectional T.V. and sectional side view (S.V.) and true shape of section. **[CO-2, L-A]**

c. A cone base 80mm diameter and axis 85mm long is resting on its base on the ground. It is cut by a section plane perpendicular to V.P. and inclined at 45^0 to the H.P. and cutting axis at a point 30mm from the apex. Draw its sectional T.V., and true shape of the section **[CO-2, L-A]**

d. Draw the development of the lateral surface of the pentagonal pyramid of which lower part is removed as shown in **figure-1** **[CO-3, L-A]**

Q.2 Attempt any TWO **12 Marks**

a. A cylinder of 50mm diameter and 70mm height and having its axis vertical, cut by a section plane perpendicular to the V.P. and inclined at 45^0 to the H.P.as shown in **figure-2.** Draw its F.V., sectional T.V., and true shape of the section. **[CO-2, L-A]**

b. Draw the development of lateral surface of the part 'P' as shown in **figure-3** (square pyramid of base30 mm, equally inclined to hp) **[CO-3, L-A]**

c. A vertical square prism 50mm side and height 10mm has face inclined at 30^0 to the V.P. it is completely penetrated by another square prism, base 38mm side 100 mm long, faces of which is equally inclined to V.P. The axes of prism are parallel to V.P. and bisect each other at right angle. Draw the projections showing lines of intersection. **[CO-4, L-A]**

12 Marks

Q. 3 **Attempt any TWO**

a. Draw the development of lateral surface of the given figure-4 of truncated cylinder. **[CO-3, L-A]**

b. A vertical cone diameter of base 75mm and axis 100mm long is completely penetrated by a cylinder of 45mm diameter. The axis of the cylinder is parallel to the H.P. and V.P. and intersects the axis of the cone at a point 28mm above the base. Draw the curves of intersection of the solids. **[CO-4, L-A]**

c. Draw the missing Top View of the given figure-5 **[CO-5, L-A]**

12 Marks

Q. 4 **Attempt any TWO**

a. **Figure-6** shows the F. V. and T.V. of the object. Draw its RHSV, which is missing. **[CO-5, L-A]**

b. **Figure-7** shows the F.V., partial auxiliary view and incomplete top view. Draw the given views and complete top view, and complete partial auxiliary view. **[CO-6, L-A]**

c. **Figure-8** shows the F.V., auxiliary top view and incomplete side view. Draw the given views, and complete the side view. **[CO-6, L-A]**

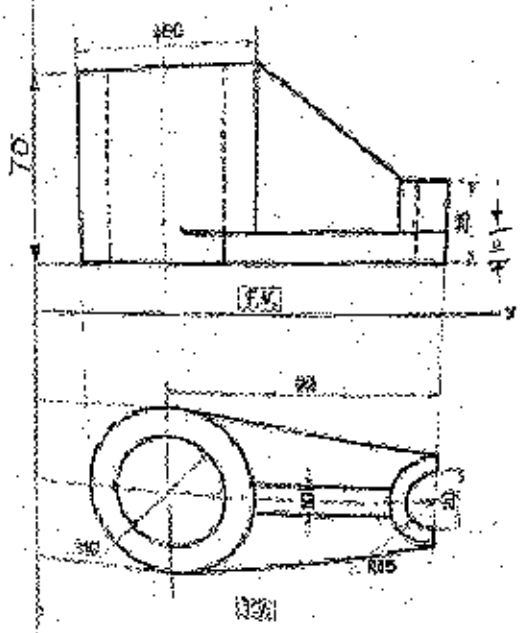
06 Marks

Q. 5 **Attempt the following**

Figure-9 shows the front view and partial auxiliary view. Draw the given figure and complete the views. **[CO-6, L-A]**

(Extra)

Fig No- 6.
Q 4(c)



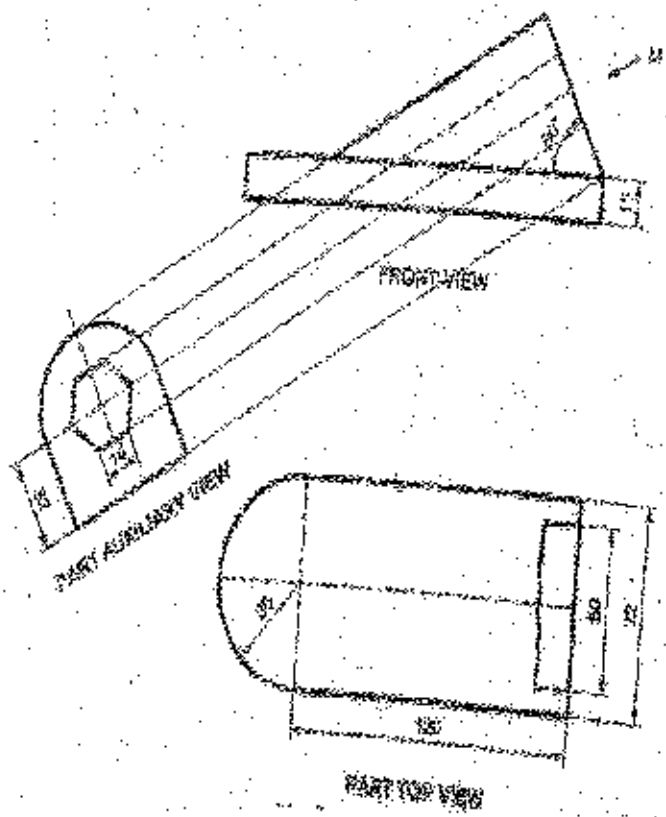


Fig No. 9.
Q. 5

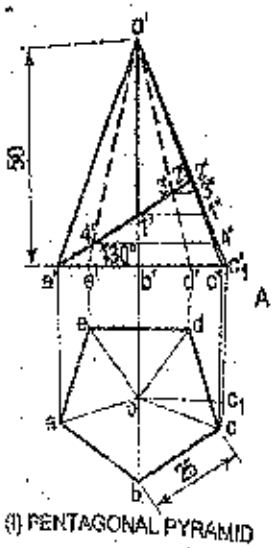
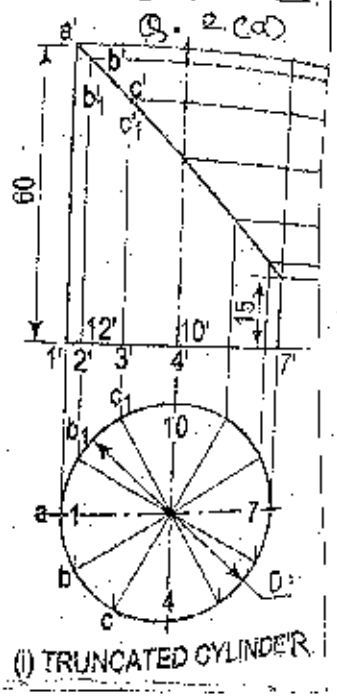


Fig No-1
Q 1.(d)

Fig No-2
Q. 2(a)



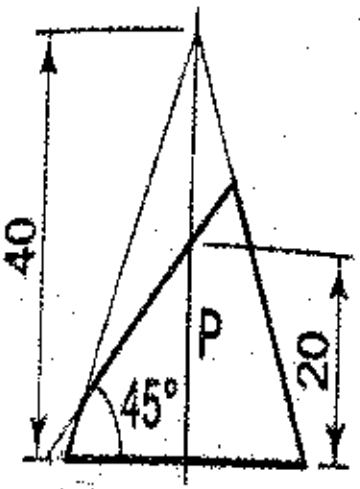


Fig. No-3
Q 2 (b)

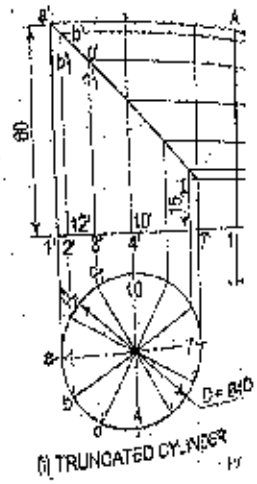


Fig No-4
Q 3 (a)

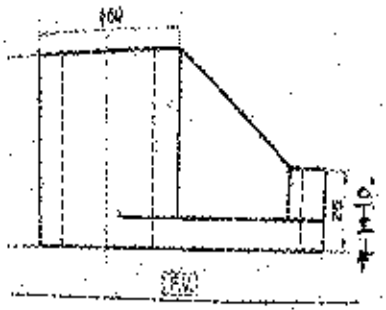


Fig No-6
Q 4 (a)

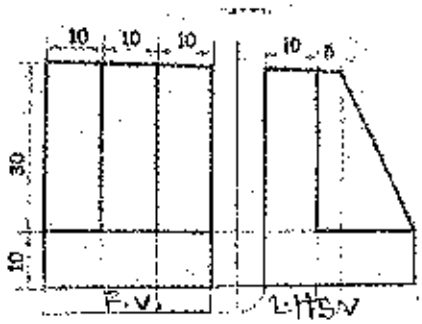


Fig No-5
Q 3 (c)

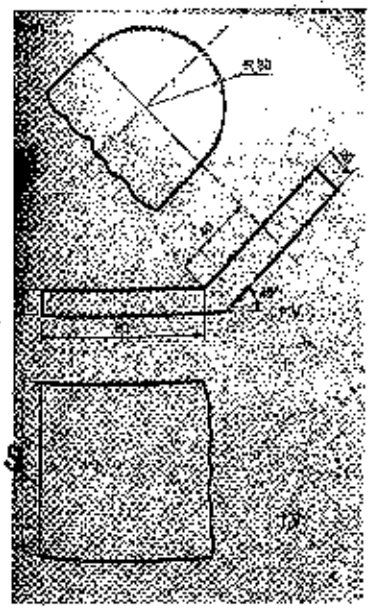


Fig No-7
Q 4 (b)

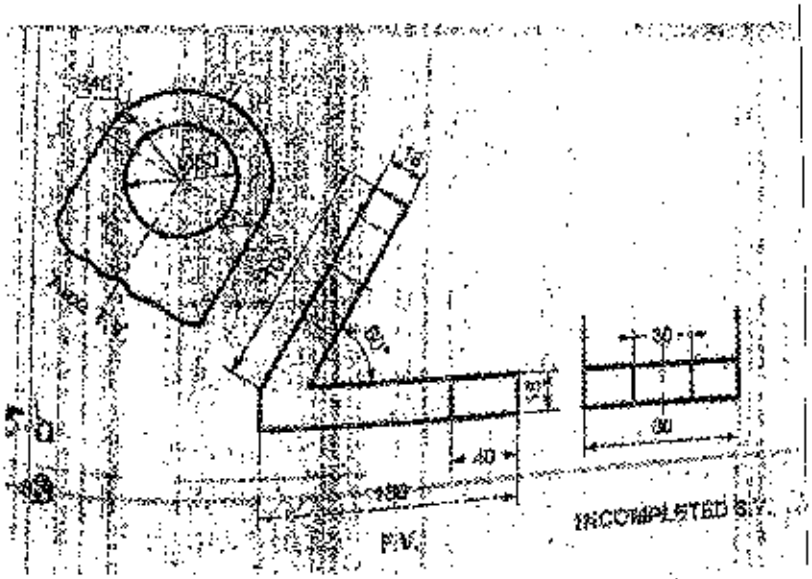


Fig No-8 Q (4 c)

EVEN 2025-26 **ME19R207/ME19207**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Fluid Mechanics & Machinery**

2:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define density. **[CO-1, L-R]**
b. Define pressure head (h). **[CO-1, L-R]**
c. Define discharge (rate of flow) and state its S.I. unit. **[CO-2, L-R]**
d. Define water hammer. **[CO-3, L-R]**
e. Write Darcy's equation to find loss of head due to friction. **[CO-3, L-R]**
f. State the meaning of TEL. (Total Energy Line) **[CO-3, L-R]**
g. State any four advantages of hydroelectric power plant. **[CO-5, L-R]**
h. Give classification of hydraulic turbines according to water head available. **[CO-5, L-R]**
i. Define slip in case of reciprocating pump. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Draw a neat labeled sketch of U-tube differential manometer. **[CO-1, L-A]**
b. State and explain different types of fluid flow. **[CO-2, L-U]**
c. State and explain Bernoulli's theorem. **[CO-2, L-U]**
d. List the minor losses in a flow through pipe. Write appropriate formulae. (any two) **[CO-3, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. A venturimeter fitted in pipe of diameter 30cm and has throat diameter 10cm. If the manometer reading is 6cm. Find discharge through pipe. Take Cd = 0.98 **[CO-2, L-A]**
b. Find the losses of head when a pipe diameter 20cm is suddenly enlarged to diameter 40cm. The rate of flow of water through a pipe is 250 liters/sec. **[CO-3, L-A]**
c. A jet of water 50mm in diameter strikes a plate normally with a velocity of 20 m/s find force experienced by the flat plate. **[CO-4, L-A]**
d. A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/sec. The plate is moving with a velocity of 6m/sec in the direction of jet. Find the force exerted by the jet on the plate. **[CO-4, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the centre of plate is 3m below the free surface of water. **[CO-1, L-A]**

b. Draw a neat sketch of Pelton wheel showing all important components. **[CO-5, L-U]**

c. Explain the construction and working of a Kaplan turbine with a neat sketch. **[CO-5, L-A]**

d. Draw a neat sketch of centrifugal pump showing all main parts. **[CO-6, L-U]**

e. Name the three types of casing used in centrifugal pump. Draw a neat sketch of volute casing. **[CO-6, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. State the functions of draft tube used in reaction turbine. Also explain the different types of draft tubes with neat sketch. **[CO-5, L-U]**

b. Describe with a neat sketch the working of double acting reciprocating pump. **[CO-6, L-A]**

c. State any three faults and their remedies commonly experienced during operation of centrifugal pump. **[CO-6, L-A]**

****End****

EVEN 2025-26 ME19R306 /ME19306

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Mechanical Engineering
Course Title : Advanced Manufacturing Processes

2:30 Hours / 60 marks Enrolment No. | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO COURSE OUTCOMES, L-LEVELS

Q.1 Attempt any SIX **12 Marks**

a. List four applications of LBM process. **[CO-2, L-A]**
b. State four advantages of lapping. **[CO-5, L-U]**
c. Define Elastomers. State any two properties. **[CO-3, L-R]**
d. List the types of maintenance. **[CO-6, L-R]**
e. Enlist types of machine foundation. **[CO-6, L-A]**
f. Define rapid prototyping. State its applications. **[CO-2, L-R]**
g. Enlist types of foundation bolts. **[CO-6, L-A]**
h. State any four advantages of blow moulding. **[CO-3, L-U]**
i. State the important objectives of machine tool maintenance. **[CO-6, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Explain working principal of shaper machine with neat sketch. **[CO-1, L-U]**
b. Give the maintenance practices to be followed for bearings. **[CO-6, L-A]**
c. Define i) Degree of freedom ii) End effector iii) Actuators iv) Links, in a robots. **[CO-4, L-U]**
d. Explain the working principal of AJM with suitable sketch. **[CO-2, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Enlist the advantages and limitation of special purpose machines (minimum two each). **[CO-1, L-U]**
b. Explain injection moulding process with sketch. **[CO-3, L-A]**
c. Classify the robots in details. **[CO-4, L-R]**
d. Explain need of foundation for machine tools. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Enlist applications of robot in manufacturing industries. **[CO-4, L-A]**
b. Explain the significance of repair cycle analysis, as applicable in machine maintenance. **[CO-6, L-U]**
c. Differentiate between polishing and buffing (minimum four points each). **[CO-5, L-U]**
d. Explain important steps in erection of machine. **[CO-6, L-U]**
e. Explain basic steps involved in powder metallurgy processes. **[CO-3, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain the different process parameters considered in EDM process. How these parameters affect on EDM process performance. **[CO-2, L-U]**

b. Explain with neat diagram working principle of honing process and write the applications of honing process. **[CO-5, L-A]**

c. Name various types of planer machines and explain construction of any one of it in brief with sketch. **[CO-1, L-U]**

****End****

EVEN 2025-26 **ME19R307/ME19307**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Production & Industrial Engineering**

2:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary.
6. CO=COURSE OUTCOMES, L- LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State different types of production systems. **[CO-1, L-R]**
b. Define process planning. Enlist the information required for process planning. **[CO-2, L-R]**
c. State the importance of production planning and control. **[CO-3, L-R]**
d. State any four objectives of method study. **[CO-4, L-R]**
e. Name various equipments required to conduct time study. **[CO-5, L-R]**
f. Define ergonomics and state its importance. **[CO-6, L-R]**
g. Enlist different types of plant layout. **[CO-1, L-R]**
h. Define routing. State its objectives. **[CO-3, L-R]**
i. Enlist the important factors to be considered while selecting the work for method study. **[CO-4, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Differentiate between job production and batch production systems. **[CO-1, L-U]**
b. State the advantages and limitations of combined operations. **[CO-2, L-R]**
c. Describe Gantt chart with suitable example. **[CO-3, L-U]**
d. Draw outline process chart to replace the refill of a ball pen. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Describe various techniques of improving productivity. **[CO-1, L-U]**
b. List the various stages at which inspection should be planned. **[CO-2, L-U]**
c. Describe important steps in method study. **[CO-4, L-U]**
d. Describe relaxation allowance and contingency allowances. **[CO-5, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Enlist important symptoms of bad plant layout. **[CO-1, L-R]**
b. Which primary and secondary questions are to be asked while performing critical examinations? **[CO-4, L-R]**
c. State important features of (MOST) Maynard Operation Sequencing Technique. **[CO-5, L-R]**
d. Draw symbols for following therbligs. **[CO-6, L-R]**
(i) Assemble (ii) Search (iii) Avoidable delay (iv) Rest (v) Transport loaded (vi) Position.
e. Enumerate general considerations while designing workplace. **[CO-6, L-R]**

Q. 5 Attempt any TWO **12 Marks**

a. Five jobs are to be processed on two machines M1 & M2. The time required for their processing in minutes is given below in Table – 1. Determine :
(i) Optimum sequence for minimum elapsed time (ii) Total time elapsed
(iii) Idle time for M1 &M2. **[CO-3, L-A]**

b. An industrial operation consist of five elements with observed time and performance rating as shown in Table – 2. Assuming personal allowance as 10% and contingency allowance as 2% of basic time. Determine the standard time. **[CO-5, L-A]**

c. Describe man-machine system with its three aspects. **[CO-6, L-U]**

Table – 1

Job → / ↓ Machine	A	B	C	D	E
M1	80	120	70	60	30
M2	20	100	40	30	50

Table – 2

Element	Observed Time (min.)	Performance Rating (%)
A	0.30	85
B	0.09	90
C	0.70	85
D	0.25	90
E	0.45	80

****End****

EVEN 2025-26

ME22407

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Rubber Technology
Course Title : Production & Industrial Engineering.

2:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO- COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define Labour Productivity. **[CO-1, L-R]**
b. List down various types of operations in process planning. **[CO-2, L-R]**
c. Define production planning and control. **[CO-3, L-R]**
d. List down various production control techniques. **[CO-3, L-R]**
e. Define primary and secondary questions in method study. **[CO-4, L-R]**
f. Define Time study. **[CO-5, L-R]**
g. Define Therbligs. **[CO-6, L-R]**
h. State the importance of ergonomics. **[CO-4, L-R]**
i. List down types of elements in time study. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the methods for improving productivity. **[CO-1, L-U]**
b. Explain process planning for a product. **[CO-2, L-U]**
c. Explain just in time system in brief. **[CO-3, L-U]**
d. Explain Maynard operation sequencing technique (MOST) in brief. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain various inspection stages. **[CO-2, L-A]**
b. Explain outline process chart with example. **[CO-4, L-A]**
c. Explain the procedure followed for conducting time study. **[CO-5, L-A]**
d. Explain the design of information display and design of controls. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain material productivity and machine productivity. **[CO-1, L-U]**

b. Explain sequence of operations to be followed in process planning. **[CO-2, L-U]**

c. Differentiate between present and proposed method in method study. **[CO4-, L-U]**

d. Explain various objectives of method study. **[CO-4, L-U]**

e. Explain the objectives of ergonomics. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain various types of plant layout. **[CO-1, L-A]**

b. Explain line balancing in brief. **[CO-3, L-A]**

c. Explain multiple activity chart with example. **[CO-6, L-A]**

****End****

EVEN 2025-26 **AM23101**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Engineering Mechanics**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define i) Mechanics ii) Simple machine. **[CO-1, L-R]**
b. Define efficiency of machine. **[CO-1, L-R]**
c. State the term 'Couple ' with its units. **[CO-2, L-R]**
d. Define coplanar and concurrent force system. **[CO-2, L-R]**
e. Enlist types of end supports. **[CO-3, L-R]**
f. State Lami's theorem with an expression. **[CO-3, L-U]**
g. Define 'Angle of repose'. **[CO-4, L-R]**
h. Define C.G.Locate the C.G of circle with diagram. **[CO-5, L-R]**
i. State kinetics and kinematics. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. In a certain machine a load of 100N is lifted by an effort of 8N at an efficiency of 60%. Find the effort lost in friction and load lost in friction. **[CO-, L-A]**
b. State law of parallelogram of forces with neat sketch also state its limitations. **[CO-2, L-U]**
c. A sphere of weight 450N rest in a grove of smooth inclined surface which are making 60° and 30° inclination to the horizontal. Find the reaction at the contact surfaces. **[CO-3, L-A]**
d. State the advantages of friction and express the relation between μ and ϕ. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Determine M.A, V.R and efficiency in a simple lifting machine a load(w) of 1200N is lifted by an effort (p) of 50N while load moves up by x = 0.2 and effort moves by (y) = 8cm. **[CO-1, L-A]**
b. Explain laws of static friction. **[CO-4, L-U]**
c. Locate the position of centroid with neat sketch semi circle and quarter circle of radius 'R'. **[CO-5, L-A]**
d. A vehicle starts from rest and reaches a velocity of 75km/hr in 10 second. Find the acceleration and distance travelled. **[CO-6, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain velocity ratio with respect to following m/c (express each term)
i) Differential wheel and axle. ii) Worm and worm wheel. **[CO-1, L-A]**

b. Classified types of coplanar forces with neat sketch. **[CO-2, L-U]**

c. A block of 200N is kept on a horizontal plane or surface is just on the point of moving by horizontal force 50N. Determine normal reaction (R) and μ. **[CO-4, L-A]**

d. A T section has a flange 200×20mm and web of 15×240mm. Find the position of centroid. **[CO-5, L-U]**

e. State the angular velocity and angular acceleration with its unit. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Determine support reaction of simply supported beam which is shown in fig.no.1. **[CO-2, L-A]**

b. Calculate magnitude and direction of resultant of force from fig.no.2. **[CO-3, L-A]**

c. Determine the position of centroid of L section from fig.no.3 where total long length 120mm and depth 100mm. **[CO-5, L-A]**

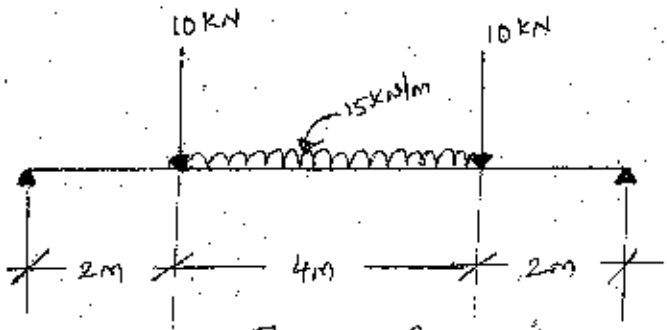


Fig No-(1)
Q-5(a)

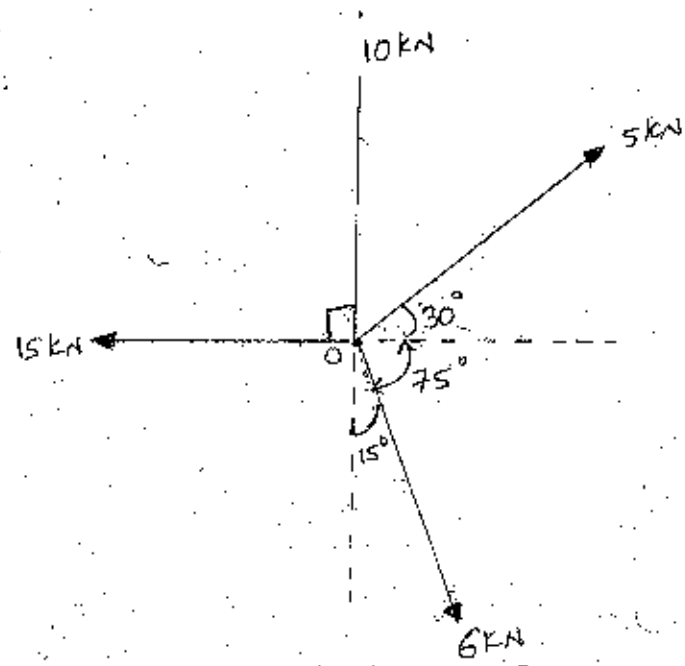


Fig No-(2)
Q-5(b)

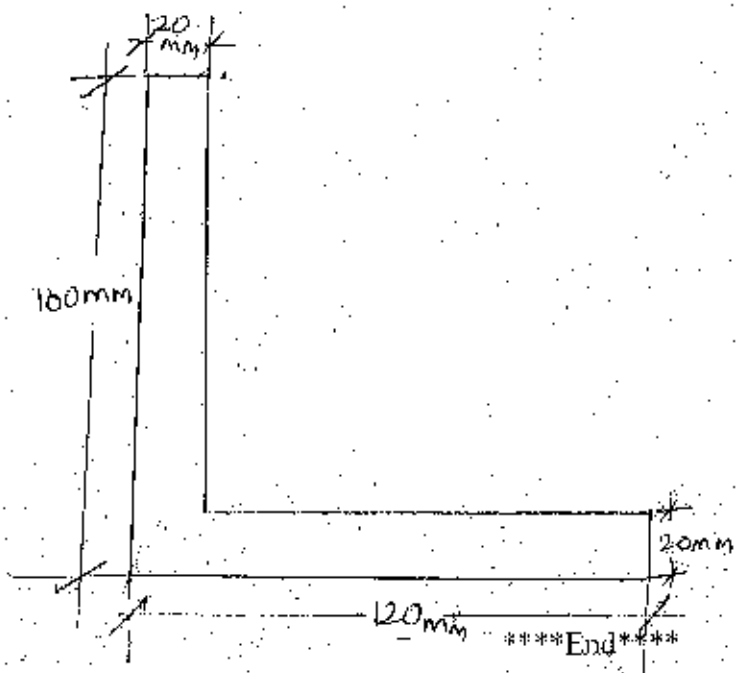


Fig No-(3)
Q-5(c)

****End****

EVEN 2025-26

ME23118

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Advance Manufacturing Processes**

2:30 Hours/ 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define non-traditional machining & list any four NTM processes. **[CO-1, L-R]**
b. State two advantages & two limitations of EDM. **[CO-1, L-U]**
c. List any four types of plastics used in manufacturing. **[CO-2, L-R]**
d. Define CNC & mention two advantages of it. **[CO-3, L-R]**
e. Define super finishing & give two applications it. **[CO-5, L-R]**
f. Define automation & list two types of Automation. **[CO-6, L-A]**
g. State any two G-codes & M-codes used in the CNC programming with their meaning. **[CO-4, L-R]**
h. Mention any two applications of powder metallurgy. **[CO-2, L-R]**
i. What is Rapid prototyping? name two techniques of RPT. **[CO-1, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Compare AJM & LBM process based on i) working principle ii) applications iii) limitations iv) accuracy. **[CO-1, L-U]**
b. Explain working of injection moulding with neat sketch. **[CO-2, L-U]**
c. Describe constructional elements of CNC machine with labeled diagram. **[CO-3, L-U]**
d. State the process parameters of Honing with their effect on accuracy. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Develop a part program for plain turning & facing operation on CNC lathe assume suitable data. **[CO-4, L-A]**
b. Write a CNC milling program for slot milling on a flat surface assume suitable data. **[CO-4, L-A]**
c. Explain any two key technologies of industry 4.0 **[CO-6, L-A]**
d. Apply powder metallurgy steps to produce a gear component. **[CO-2, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain working principle of ECM with neat sketch. **[CO-1, L-U]**
b. Differentiate between open loop & closed loop CNC system. **[CO-3, L-U]**
c. Describe surface enhancement process: shot peening. **[CO-5, L-U]**

d. List essential components of an automated system. [CO-6, L-U]

e. Explain need of tool offsetting & tool presetting in CNC machines. [CO-4, L-U]

Q. 5 Attempt any TWO **12 Marks**

a. Explain axis identification system used in CNC milling machine with sketch. [CO-4, L-A]

b. Explain construction & working of recirculating ball screw with neat sketch. [CO-3, L-A]

c. Describe the needs, applications & disadvantages of automation. [CO-6, L-A]

****End****

EVEN 2025-26

ME23113

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Manufacturing Processes**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt **all** the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO- COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define indexing. **[CO-4, L-R]**
b. List the factors affecting selection of pattern material. **[CO-1, L-U]**
c. List any four types of drilling machine. **[CO-3, L-R]**
d. State the working principle of turning. **[CO-2, L-R]**
e. List the desirable ingredients of moulding sand. **[CO-1, L-R]**
f. State the applications of milling cutter. **[CO-4, L-R]**
g. State the factors which influence weldability. **[CO-6, L-U]**
h. List any four parts of lathe machine. **[CO-2, L-R]**
i. Name the abrasives used in grinding wheel. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain with sketch spot facing and counter boring. **[CO-3, L-U]**
b. Differentiate between end milling and face milling. **[CO-4, L-U]**
c. Describe following defects in welding. (i) Cracks (ii) Inclusion (iii) Spatter (iv) Undercut. **[CO-6, L-R]**
d. Describe dressing and truing of grinding Wheel with neat sketch. **[CO-5, L-R]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain following properties of moulding sand. (i) Flowability (ii) Collapsibility (iii) Porosity (iv) Refractoriness. **[CO-1, L-R]**
b. Describe the safety precautions to be followed while working on drilling machine. **[CO-3, L-U]**
c. Draw a labelled sketch of single point cutting tool. **[CO-2, L-R]**
d. List the probable causes and suggest remedies for following casting defects. (i) Shifts (ii) Hot tears. **[CO-1, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. With neat sketch, explain surface grinding. **[CO-5, L-R]**
b. Enlist safety precautions to be followed in foundry shop. **[CO-1, L-R]**
c. Define speed, feed and depth of cut in drilling process. **[CO-3, L-U]**
d. Give the meaning of each term of grinding wheel W A 54 M 7 V 20. **[CO-5, L-A]**
e. List down the steps in brazing operation. **[CO-6, L-R]**

Q. 5 Attempt any TWO **12 Marks**

a. Classify lathe and list the operations performed on lathe. **[CO-2, L-R]**

b. Differentiate between upmilling and downmilling. **[CO-4, L-R]**

c. Explain with neat sketch MIG welding. State advantages and applications. **[CO-6, L-R]**

****End****

EVEN 2025-26 **ME23110**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Fluid Mechanics & Machinery**

2:30 Hours / 60 marks Enrolment No. [| | | | | | | | | |]

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define specific weight. **[CO-1, L-R]**
b. State continuity equation. **[CO-2, L-R]**
c. Define total pressure. **[CO-1, L-R]**
d. State chezy's equation for loss of head. Name the variables. **[CO-3, L-U]**
e. Define cavitation in turbines. **[CO-5, L-R]**
f. List commonly used draft tubes. **[CO-5, L-R]**
g. State uses of air vessels. **[CO-6, L-R]**
h. Define suction head and delivery head. **[CO-6, L-R]**
i. State the concept of priming in centrifugal pump. **[CO-6, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Compare simple manometer with differential manometer **[CO-1, L-U]**
b. State assumptions made in Bernoulli's theorem. **[CO-2, L-A]**
c. State laws of fluid friction for laminar flow. **[CO-3, L-A]**
d. A jet of water 50mm dia. strikes on a fixed plate normally with a velocity of 25 mls, find the force exerted on flat plate. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain concept of Absolute vacuum, Gauge pressure, Atmospheric pressure and Absolute pressure. **[CO-1, L-U]**
b. Derive and expression for force exerted by the jet on stationary inclined flat plate in direction of jet. **[CO-4, L-A]**
c. Draw inlet and outlet triangles for bucket in pelton wheel with the meaning of each term. **[CO-5, L-A]**
d. Explain with neat sketch. Construction and working of double acting reciprocating pump. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain construction and working principle of pitot tube. **[CO-2, L-U]**

b. Define i) total energy line ii) Hydraulic gradient line. **[CO-3, L-U]**

c. State equation for: i) Loss of head due to sudden enlargement ii) Loss of head due to sudden contraction. **[CO-3, L-A]**

d. Obtain an expression for force exerted by water jet on fixed vertical plate. **[CO-4, L-U]**

e. Draw layout of hydroelectric power plant. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Apply Bernoulli's equation, derive the equation for discharge through venturimeter. **[CO-2, L-A]**

b. Differentiate between impulse and reaction turbine. **[CO-5, L-U]**

c. Define the term multistage pump. Explain construction and working of multistage pump. **[CO-6, L-U]**

****End****

EVEN 2025-26 **ME23104**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Fundamental of Electrical Tech. & Electronics**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO-COURSE OUTCOMES, L-LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State Lenz's law. **[CO-1, L-R]**
b. State the factors affecting resistance. **[CO-1, L-R]**
c. Define turns ratio and transformation ratio. **[CO-2, L-R]**
d. State working principle of induction motor. **[CO-3, L-R]**
e. Define : (i) % slip (ii) Synchronous speed. **[CO-3, L-R]**
f. State the necessity of filter. **[CO-4, L-R]**
g. Draw the block diagram of D.C. regulated power supply. **[CO-5, L-R]**
h. Compare load and line regulation on any two points. **[CO-5, L-R]**
i. State any two applications of SCR. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. An electric kettle has a resistance of 20Ω and is connected to a 220V supply. How much energy is consumed in 15 minutes? **[CO-1, L-U/A]**
b. Compare single phase and three phase transformer on any four points. **[CO-2, L-U]**
c. Explain full wave bridge rectifier circuit with diagram. **[CO-4, L-U]**
d. State necessity of biasing. Define DC operating point and load line. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain working principle of transformer with neat diagram. **[CO-2, L-U]**
b. Explain slip ring induction motor. **[CO-3, L-U]**
c. Draw pin diagram of 78 X X series IC regulator and state it's any four specification. **[CO-5, L-U]**
d. Draw and explain working of NPN transistor in active mode. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain concept of power and power factor. **[CO-1, L-U]**
b. Explain losses occurring in transformer. **[CO-2, L-U]**
c. Draw torque – slip characteristics of 3ϕ induction motor. **[CO-3, L-U]**
d. Draw and explain V-I characteristics of P-N junction diode. **[CO-4, L-U]**
e. Draw symbol of SCR, TRIAC and DIAC and label it. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Enlist speed control methods of induction motor and explain any one. **[CO-3, L-U]**

b. (i) List any 3 active and any 3 passive components.
(ii) Explain Pi filter with waveform. **[CO-4, L-R/U]**

c. Explain working of BJT with neat circuit diagram and state its applications. **[CO-6, L-U]**

****End****

EVEN 2025-26 **ME23115**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Metrology and Quality Assurance**

2:30 Hours/ 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES. L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define (i) Accuracy (ii) Precision. **[CO-1, L-R]**
b. State the characteristics of good comparators. **[CO-2, L-R]**
c. List out instruments used for angular measurements. **[CO-3, L-R]**
d. Define : (i) Roundness (ii) Runout. **[CO-4, L-R]**
e. State the significance of tolerances. **[CO-4, L-R]**
f. Define 'Ra' with its expression. **[CO-5, L-R]**
g. Define laser metrology. **[CO-5, L-R]**
h. State the concept of quality assurance. **[CO-6, L-R]**
i. Define acceptance sampling. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the different types of errors in measurement. **[CO-1, L-U]**
b. Draw the sketch of vernier caliper label it; state its applications. **[CO-2, L-A]**
c. Explain working principle of sine bar with neat sketch. **[CO-3, L-U]**
d. Explain hole basis system and shaft basis system with neat sketch. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain the following terms (i) Repeatability (ii) Sensitivity. **[CO-1, L-U]**
b. Explain the working mechanism of dial indicator with diagram. **[CO-2, L-A]**
c. Draw neat sketch of surface finish symbol, showing important elements on it. **[CO-5, L-U]**
d. Define inspection and explain need of inspection. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. State the characteristics of line standard and end standard. (any three points) **[CO-1, L-R]**
b. Explain the process of wringing of slip gauges. **[CO-2, L-R]**
c. An angle of $35^0 10' 12''$ is to be measured and to be set with the help of following angle gauge [$1^0, 3^0, 9^0, 27^0, 41^0$], [1', 3', 9', 27'], [3", 6", 18", 30"]. Set the angle gauge and show the arrangement. **[CO-3, L-A]**
d. Draw the fringes observed by use of optical flat for flat surface, concave surface, convex surface. **[CO-5, L-A]**
e. State the application of CMM machines. **[CO-5, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Define effective diameter of screw thread and explain the two wire method of thread measurement with neat sketch. **[CO-3, L-A]**

b. Explain the following alignment testing of lathe machine as per IS standard procedure with neat sketches. (i) True running of main spindle (ii) Squareness of chuck face with horizontal bed surface. **[CO-4, L-A]**

c. Following are the inspection results of soldered PCB boards for 6 days. Draw proper control chart and comment on the process. **[CO-6, L-A]**

Day	1	2	3	4	5	6
Number of PCB Checked	30	35	28	25	30	34
Defects Found	6	4	1	4	3	2

****End****

EVEN 2025-26 **ME23116**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Industrial Hydraulics & Pneumatics**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State any two advantages of oil hydraulic systems. **[CO-1, L-R]**
b. Explain function oil filters. Enlist any two types of oil filters. **[CO-2, L-R]**
c. State the common applications of pneumatic system. **[CO-1, L-R]**
d. State the use of F-R-L unit and time delay valve. **[CO-4, L-R]**
e. Draw neat sketch of non-compensated flow control valve. **[CO-3, L-R]**
f. Draw ISO symbols for i) Pressure relief valve ii) Unloading valve. **[CO-3, L-R]**
g. State application of double acting hydraulic cylinder. **[CO-5, L-A]**
h. Enlist any four elements of hydraulic circuits. **[CO-5, L-R]**
i. Draw symbol for unidirectional and bidirectional air motor. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the selection criteria for hydraulic pump. **[CO-2, L-U]**
b. List different safety precautions required for handling industrial hydraulics and pneumatic systems. **[CO-1, L-A]**
c. Explain with neat sketch pressure reducing valve. **[CO-4, L-U]**
d. Explain time delay circuit in detail. **[CO-6, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Draw a neat sketch of pressure reducing valve. Explain its working. **[CO-3, L-U]**
b. Explain with neat sketch double acting reciprocating compressor. **[CO-4, L-U]**
c. Compare meter in circuit and meter out circuit in hydraulic system. **[CO-5, L-U]**
d. Explain with a neat sketch pneumatic circuit used for speed control of air motor. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Draw actual hydraulic system and explain its working. **[CO-1, L-U]**

b. Classify air compressor. Enlist any two application of air compressor. **[CO-4, L-A]**

c. Compare gear pump and piston pump. **[CO-2, L-U]**

d. Draw hydraulic circuit for grinding machine. **[CO-5, L-A]**

e. Draw labelled circuit diagram of travel dependent sequencing circuits with cam. **[CO-6, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain 4 ways – 3 position direction control valve used in hydraulic system with neat sketch. **[CO-3, L-A]**

b. Explain with neat sketch of hydraulic circuit used in milling machine. **[CO-5, L-U]**

c. List common faults observed in hydraulic system and state their remedies. **[CO-2, L-A]**

****End****

EVEN 2025-26 **ME23105**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering**
Course Title : **Mechanical Measurement & Mechatronics**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define range and span. **[CO-1, L-R]**
b. Define calibration. **[CO-1, L-R]**
c. List down the various devices for displacement measurement. **[CO-2, L-R]**
d. List down the types of strain gauges. **[CO-2, L-R]**
e. List down the various non-electrical methods for temperature measurement. **[CO-3, L-R]**
f. Define mechatronics. **[CO-4, L-R]**
g. List down the types of control system. **[CO-5, L-R]**
h. Define latch and unlatch. **[CO-6, L-R]**
i. List down advantages of PLC. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain the classification of errors. **[CO-1, L-A]**
b. List down the various devices for speed measurement and explain any one of them with neat sketch. **[CO-2, L-U]**
c. Explain ultrasonic flowmeter with neat sketch. **[CO-3, L-A]**
d. Explain feedback control system with neat sketch. **[CO-5, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain thermistor with neat sketch. **[CO-3, L-U]**
b. Explain optical encoder with neat sketch. **[CO-4, L-U]**
c. Explain any one PID control system. **[CO-5, L-U]**
d. Explain maintenance of PLC. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain the classification of instruments. **[CO-1, L-U]**
b. Explain selection criteria for strain gauges. **[CO-2, L-U]**
c. Explain hot wire and hot film anemometer. **[CO-3, L-U]**
d. List down the applications of mechatronics system. **[CO-4, L-U]**
e. Explain microcontrollers in brief. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain working principle of LVDT with neat sketch. **[CO-2, L-A]**
b. Explain block diagram of electro-mechanical system in brief. **[CO-4, L-A]**
c. Explain block diagram of PLC with neat sketch. **[CO-6, L-A]**

****End****

EVEN 2025-26 **ME23119**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Mechanical Engineering
Course Title : Engineering Drawing-II

3:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any THREE **18 Marks**

a. A hexagonal pyramid base 30 mm side and axis 70 mm long has an edge of its base on the ground. Its area is inclined at 30° to the ground and parallel to the V.P. Draw its projection. **[CO-1, L-A]**

b. A cone diameter of base 40 mm, axis height 60 mm has one of its generator on the H.P. and axis parallel to the V.P. Draw the projection of cone. **[CO-1, L-A]**

c. A triangular pyramid having base 40 mm side and axis 70 mm long is lying on H.P. on one of its faces with the axis parallel to the V.P. A section plane parallel to the V.P. cuts the pyramid at a distance of 8 mm from the axis. Draw its sectional front view and top view **[CO-2, L-A]**

d. Draw the development of the lateral surface of the square pyramid, shown in fig. no. 1 **[CO-3, L-A]**

Q.2 Attempt any TWO **12 Marks**

a. A cone base 60 mm diameter and its axis 75 mm long is resting on its base on the H.P. It is cut by a sectional plane perpendicular to the V.P. inclined 45° to H.P. and cutting axis at a point 30 mm from the apex. Draw its front view, sectional top view and true shape of the section. **[CO-2, L-A]**

b. A cylinder of 60 mm diameter and axis 75 mm long stands with its base on H.P. It is completely penetrated by a horizontal cylinder of 40 mm diameter and 60 mm long, such that their axes bisects each other at right angles. The axis of cylinder is parallel to the V.P. Draw its projection showing curves of intersection. **[CO-4, L-A]**

c. Fig. No. 2 shows F.V. and R.H.S of the object. Draw its T.V. which is missing. **[CO-5, L-A]**

Q. 3 Attempt any TWO **12 Marks**

a. A cylinder 50 mm diameter, 60 mm long having its axis vertical is cut by a section plane perpendicular to the V.P. inclined at 45° to the H.P. and intersecting the axis 30 mm above the base. Draw its Front view, Sectional top view and true shape of the section. **[CO-2, L-A]**

b. Fig. No. 3 shows the F.V. and R.H.S.V. of the object by first angle method of projection. Draw its T.V. by the same method which is missing.**[CO-5, L-A]**

c. Fig No. 4 shows the F.V. incomplete top view and partial auxiliary view of a machine part. Using the given views complete the top view of the object. **[CO-6, L-A]**

Q. 4 Attempt any TWO **12 Marks**

a. Draw the development of lateral surfaces of the lower portion of the prism as shown in Fig. No. 5. **[CO-3, L-A]**

b. A vertical hexagonal prism of 35 mm side and 70 mm height is penetrated centrally by a horizontal cylinder of 40 mm diameter and 80 mm long. The axis of cylinder is parallel to V.P. and perpendicular to the axis of the prism. Draw the projection of the solid showing the curves of intersection. **[CO-4, L-A]**

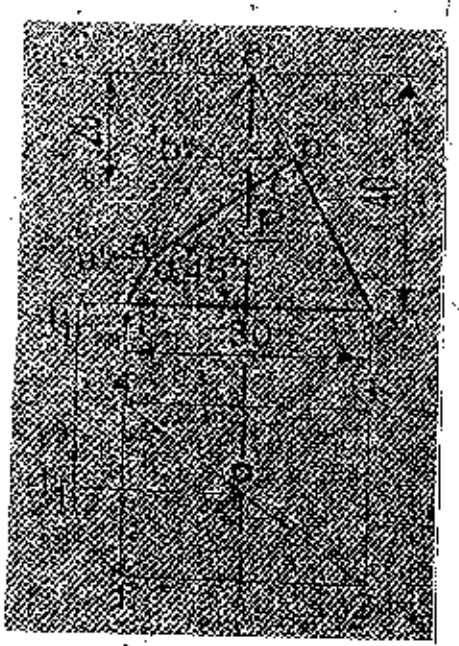
c. A vertical cone, diameter of base 70 mm and axis 100 mm long is completely penetrated by a cylinder of 50 mm diameter. The axis of cylinder is parallel to H.P. and V.P. and intersects the axis of a cone at a point 28 mm above the base. Draw the projections of solid showing the curves of intersections. **[CO-4, L-A]**

Q. 5 Attempt the following **06 Marks**

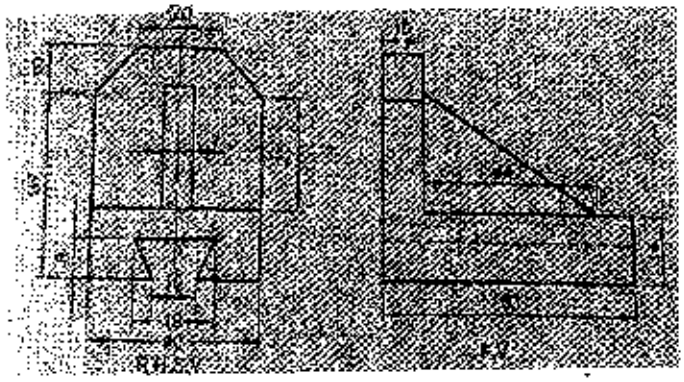
a. Fig. No. 6 shows front view and partial auxillary view and incomplete top view of an object. Redraw the given fig. and complete the top view. **[CO-6, L-A]**

****End****

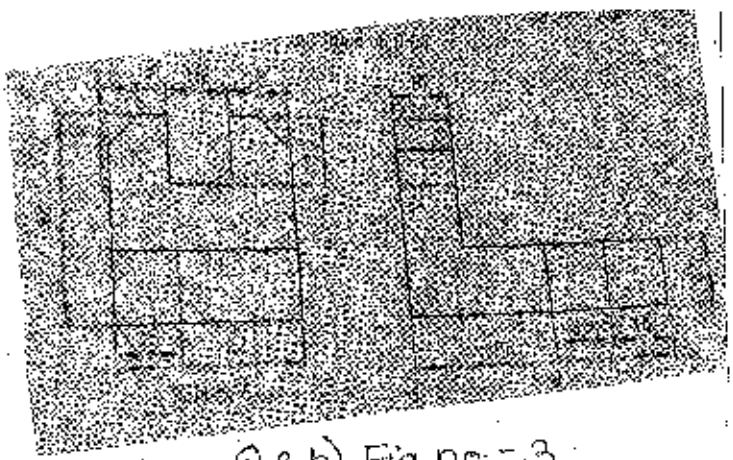
EVEN 2025-26



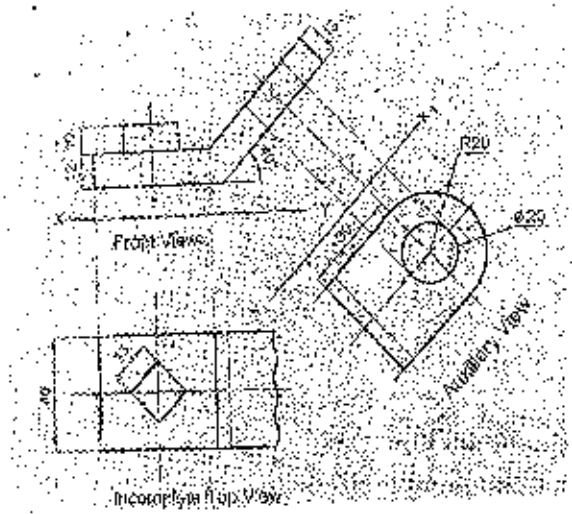
Q.1 d) Fig no.-1.



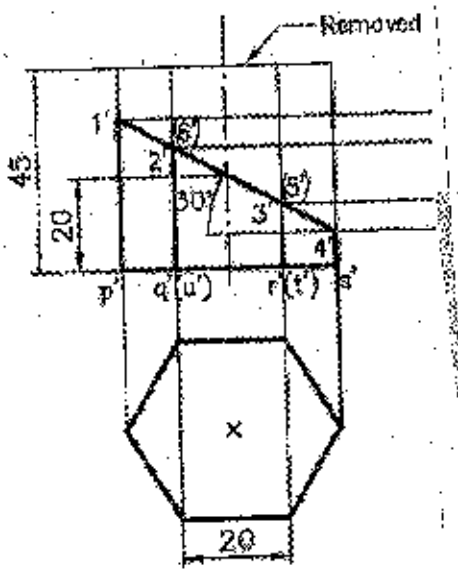
Q.2 c) Fig no.- 2.



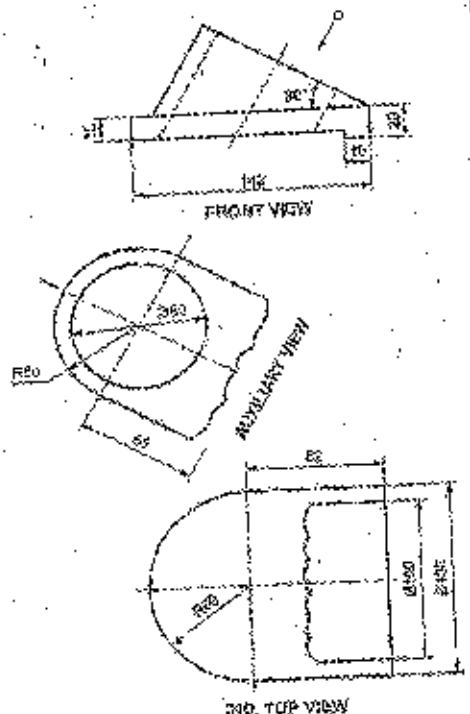
Q.3 b) Fig no.- 3



Q.3 c) Fig no.-4



Q.4 a) Fig no.-5



Q.5. a) Fig. no.-6

****END****

EVEN 2025-26

ME23114

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Rubber Technology (Sandwich Pattern)
Course Title : Industrial Engineering & Management

2:30 Hours / 60 marks Enrolment No. | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO -COURSE OUTCOMES, L- LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the symptoms of good plant layout. **[CO-1, L-R]**
b. Define production and productivity. **[CO-1, L-R]**
c. State the equipment used in time study. **[CO-2, L-R]**
d. State the need of ergonomics. **[CO-3, L-R]**
e. List out display applied in ergonomics. **[CO-3, L-R]**
f. State the skills of manger required in management. **[CO-4, L-R]**
g. State the advantages of on job training. **[CO-5, L-R]**
h. List out benefits provided under act to insured persons. **[CO-6, L-R]**
i. State the meaning of 'Industrial Dispute'. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Classify the production system and explain any one production system. **[CO-1, L-A]**
b. Explain basic steps of selection of work for method study. **[CO-2, L-A]**
c. Explain design of control in ergonomics applied for push button and knob. **[CO-3, L-U]**
d. Explain the levels of management. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Classify the allowances in details. **[CO-2, L-A]**
b. Explain an organizational structure with an example. **[CO-4, L-U]**
c. Explain the types of capital in financial management. **[CO-5, L-U]**
d. Explain the causes of accident in industry. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain the functions of P.P.C (Production planning and control). **[CO-1, L-U]**
b. Draw the symbols which are used in method study charts. **[CO-2, L-A]**
c. State the relation between management and administration. **[CO-4, L-R]**
d. Classify the types of training in personnel management. **[CO-5, L-A]**
e. Describe about workmen's compensation act 1923 with partial and total disablement. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Differentiate between process layout and product layout and state the advantages of process layout. **[CO-1, L-U]**

b. Explain outline process charts and two hand charts with an examples. **[CO-2, L-A]**

c. Explain ABC analysis of material. **[CO-5, L-U]**

****End****

EVEN 2025-26

ME23201

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Automobile Engineering**

2:30 Hours/ 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State different types of vehicle layouts. **[CO-1, L-R]**
b. State the function of chassis & frame. **[CO-1, L-R]**
c. State the requirement of transmission system in automobiles. **[CO-2, L-R]**
d. State the function of propeller shaft and fluid fly wheel. **[CO-2, L-R]**
e. State the necessity of steering system in automobiles. **[CO-3, L-R]**
f. Enlist different types of suspension system. **[CO-4, L-R]**
g. State the need of charging system in automobiles. **[CO-5, L-R]**
h. Define Battery capacity and battery rating. **[CO-5, L-R]**
i. Name various components of air conditioning system in automobiles. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Describe construction and working of power steering. **[CO-3, L-U]**
b. With sketch, describe constructional feature of leaf spring. **[CO-2, L-U]**
c. Explain working of battery ignition system with neat sketch. **[CO-5, L-U]**
d. Explain working of car air conditioning system, with its layout. **[CO-6, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Draw the layout of 4 wheel drive and name important parts of it also state the advantages of four wheel drives. **[CO-1, L-U]**
b. Enlist two faults and their remedies in clutches. **[CO2-, L-A]**
c. Draw the layout of ABS system used in recent vehicles. **[CO-3, L-A]**
d. Enlist the precaution to be taken while using, AC system in automobiles. Also state the parameter to be controlled in air conditioning system of a car. **[CO-6, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Draw the layout of electric vehicle. **[CO-1, L-A]**
b. Enlist safety precaution to be followed while handling automobile accessories and equipments. **[CO-1, L-A]**
c. Differentiate between constant mesh gear box and synchromesh gear box (min 3 points each). **[CO-2, L-U]**
d. State the features affecting the life of tyre in automobiles. **[CO-4, L-R]**

c. State the need of starting system in automobiles. [CO-5, L-R]

Q. 5 Attempt any TWO **12 Marks**

a. With neat sketch, explain constructions and working of different gear box in automobiles. [CO-2, L-A]

b. Explain construction and working of air breaking system, with its layout diagram. [CO-3, L-U]

c. Explain the procedure of wheel alignment and wheel balancing. [CO-4, L-A]

****End****

EVEN 2025-26 **ME23111**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Material Technology**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define atomic packing factor. **[CO-1, L-R]**
b. List down types of plain carbon steel. **[CO-2, L-R]**
c. Name various defects in crystal structures. **[CO-1, L-R]**
d. State the application of white cast iron. **[CO-2, L-R]**
e. State the needs of alloy steel. **[CO-3, L-R]**
f. Enlist the any two non-ferrous materials with their properties. **[CO-4, L-R]**
g. State different applications of ceramics materials. **[CO-4, L-R]**
h. State the objectives of heat treatment. **[CO-5, L-R]**
i. Enlist the names of different quenching media used in heat treatment. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain body centered cubic structure with neat sketch. State its example. **[CO-1, L-U]**
b. Classify cast irons with their amount of carbon content into them. **[CO-2, L-U]**
c. Differentiate between annealing and normalizing. **[CO-5, L-U]**
d. Explain the procedure of dye penetrant testing. **[CO-6, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain the properties and applications of high speed steel. **[CO-3, L-U]**
b. Draw and label the micro structure of babbits also state their properties and state the use of babbits material. **[CO-4, L-A]**
c. Explain the effect of retained austenite in martensitic transformation. **[CO-5, L-A]**
d. Explain the procedure of hardness measurement by brinell method with diagram. **[CO-6, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Classify engineering materials in detail. **[CO-1, L-A]**
b. Explain the needs of composite materials. **[CO-3, L-U]**
c. State the applications of plain carbon steel and cast irons. **[CO-2, L-A]**

d. State important properties of LM6. [CO-4, L-U]
e. Explain importance of wear testing and crack detection test. [CO-6, L-A]

Q. 5 Attempt any TWO **12 Marks**

a. Draw Fe-Fe3C diagram indicating all important temperature, phases and compositions. [CO-2, L-A]
b. List down properties and applications of i) MMC ii) Nano composites iii) Shape memory alloys. [CO-3, L-A]
c. Explain pollution and environmental related issues related to heat treatments. [CO-5, L-A]

****End****

EVEN 2025-26

ME23117

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Design of Machine Elements**

3:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO-COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define machine design. **[CO-1, L-R]**
b. Define fatigue failure. **[CO-1, L-R]**
c. State function of key. **[CO-3, L-R]**
d. List applications of cotter joints. **[CO-2, L-R]**
e. Classify the shaft couplings. **[CO-3, L-U]**
f. Define off-set links. **[CO-2, L-R]**
g. Draw the symbolic representation of following types of weld i) Weld all around ii) Single U butt weld. **[CO-4, L-A]**
h. Enlist applications of power screw. **[CO-5, L-R]**
i. Enlist the types of stresses induced in power screw. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Compare rigid and flexible coupling. **[CO-3, L-U]**
b. Explain with neat sketch the stress-strain diagram for ductile and brittle materials. **[CO-1, L-U]**
c. Draw free hand sketches of thread profile (any two) with full details. **[CO-4, L-U]**
d. Explain the term self locking and overhauling of screw. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Draw neat sketch of knuckle joint and state its strength equation (any four). **[CO-2, L-A]**
b. Classify pressure vessels. **[CO-4, L-U]**
c. State and explain the significance of "Wahl's factor". **[CO-6, L-U]**
d. The lead screw of a lathe has acme threads of 50mm outside diameter and 8mm pitch. The screw must exert an axial pressure of 2500N in order to drive the tool carriage. The thrust is carried on a collor 110mm outside diameter and 55mm inside diameter and lead screw rotates at 30 r.p.m determine i) The power required to drive the screw. ii) Efficiency of the lead screw.
Assume $\mu = 0.15$ for screw
$\mu = 0.12$ for color. **[CO-5, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain steps 'Involved' in general design procedure. **[CO-1, L-U]**

b. Differentiate between cotter joint and knuckle joint (any three points). **[CO-2, L-U]**

c. State the effects of keyway on the strength of the shaft. **[CO-3, L-U]**

d. Derive the expression for hoop stress in a thin cylindrical shell. **[CO-4, L-A]**

e. State any six application of spring. **[CO-6, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Sketch protective type flange coupling and explain its design. **[CO-3, L-A]**

b. Explain stress concentration. Illustrate methods of reducing stress concentration with neat sketches. **[CO-1, L-A]**

c. Design a closed coil helical spring for service load ranging from 2207N to 2698N. The axial deflection of spring is 6mm. Assume spring index as 5. The permissible shear stress is 420N/mm^2 , modulus of rigidity 84×10^3N/mm^2. Neglect effect of stress concentration. **[CO-6, L-A]**

****End****

EVEN 2025-26 **ME23108**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Theory of Machines**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define kinematic link and kinematic chain. **[CO-1, L-R]**
b. Define angular velocity and angular acceleration. **[CO-2, L-R]**
c. State the function of governor. **[CO-3, L-R]**
d. Enlist various follower motions. **[CO-4, L-R]**
e. Define angle of lap. **[CO-5, L-R]**
f. Define slip an creep in case of belt drive. **[CO-5, L-R]**
g. Give the limitations of shoe brake. **[CO-6, L-U]**
h. State the function of clutch. **[CO-6, L-R]**
i. State the function of flywheel in I.C engine. **[CO-3, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain with neat sketch the working of whit worth quick return mechanism. **[CO-1, L-U]**
b. Justify with neat sketch, elliptical trammel as an inversion of double slider crank chain. **[CO-1, L-A]**
c. Explain Klein's construction to determine velocity and acceleration of single slider crank mechanism. **[CO-2, L-U]**
d. The stroke of a steam engine mechanism is 60cm and length of connecting rod is 120cm. Find velocity of cross-head & angular velocity of connecting rod by analytical method, when the crank rotates at 180rpm & it is inclined at 20° with I.D.C. **[CO-2, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain function of flywheel with turning moment diagram for single cylinder 4 stroke I.C engine. **[CO-3, L-A]**
b. Differentiate between flywheel and governor. **[CO-3, L-U]**
c. Explain with neat sketch different types of followers. **[CO-4, L-U]**
d. Find the power transmitted by a belt running over a pulley of 600mm diameter at 200rpm. Coefficient of friction between the belt & the pulley is 0.25, angle of lap is 160° & maximum tension in the belt is 2500N. **[CO-5, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Write the procedure for balancing of a single rotating mass by single mass rotating in the same plane. **[CO-3, L-U]**

b. State advantages of roller follower over knife edge follower. **[CO-4, L-U]**

c. Compare flat belt & v-belt at least three points. **[CO-5, L-U]**

d. State advantages of chain drive over belt drive. **[CO-5, L-R]**

e. Draw neat sketch of internal expanding brakes and label it. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Crank of a slider crank mechanism rotates clockwise at a constant speed of 300rpm. The crank is 150mm & the connecting rod is 600mm long. Determine i) Linear velocity and acceleration of the mid-point of the connecting rod ii) Angular velocity & angular acceleration of the connecting rod at a crank angle of 45° from inner dead center position. **[CO-2, L-A]**

b. Draw the profile of cam operating a knife edged follower having a lift of 30mm. The cam raises the follower with S.H.M for 150° of its rotation followed by a period of dwell for 60°. The follower descends for the next 100° rotation of cam with uniform velocity again followed by a dwell period. The cam rotates at a uniform velocity of 120rpm and has least radius of 20mm. **[CO-4, L-A]**

c. Explain with neat sketch working of single plate clutch. **[CO-6, L-U]**

****End****

EVEN 2025-26

ME23107

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Engineering Thermodynamics**

2:30 Hours / 60 marks Enrolment No.

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define enthalpy and its unit. **[CO-1, L-R]**
b. State Boyle's law with its expressions. **[CO-2, L-R]**
c. State the term of dry fraction. **[CO-3, L-R]**
d. Define mach number. **[CO-4, L-R]**
e. State function of nozzle. **[CO-4, L-R]**
f. State the function of steam condensers. **[CO-5, L-R]**
g. Define condenser efficiency. **[CO-5, L-R]**
h. State the term LMTD and NTU. **[CO-6, L-R]**
i. State Newton's law of cooling. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain first law of thermodynamics with neat sketch. **[CO-1, L-A]**
b. Explain process of throttling with P.V and T.S diagram. **[CO-2, L-U]**
c. Draw the layout of steam power plant and explain the functions of any four components. **[CO-3, L-A]**
d. Explain the following term related to the turbine i) Regenerative feed heating ii) Bleeding of steam. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Differentiate reversible and non-reversible process. **[CO-1, L-A]**
b. Explain the properties of a steam. **[CO-3, L-U]**
c. Compare surface condenser with jet condenser. **[CO-5, L-A]**
d. Explain construction and working of shell type heat exchanger. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Derive the characteristics of gas equation PV=mRT. **[CO-2, L-A]**
b. Classify different types of boiler. **[CO-3, L-U]**
c. State advantages of governing in steam turbine. **[CO-4, L-A]**
d. Explain losses occur in steam turbine. **[CO-4, L-U]**
e. Explain effect of air leakage into a condenser. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Derive steady flow energy equation for i) Nozzle ii) Heat pum. **[CO-1, L-A]**

b. Explain the construction and working principle of forced draught cooling tower with neat sketch. **[CO-5, L-U]**

c. Explain thermal radiation with the following term i) Absorptivity ii) Transmissivity iii) Reflectivity. **[CO-6, L-A]**

****End****

EVEN 2025-26 **ME23203**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Mechanical Engineering (Sandwich Pattern)**
Course Title : **Tool Engineering**

2:30 Hours / 60 marks Enrolment No.

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define orthogonal & oblique cutting. **[CO-1, L-R]**
b. State the significance of 3-2-1 principle. **[CO-2, L-R]**
c. List types of jigs used in machining. **[CO-3, L-R]**
d. Define die clearance & its importance. **[CO-4, L-R]**
e. State any two types of bending dies. **[CO-5, L-R]**
f. List materials used for forging dies. **[CO-6, L-R]**
g. Write tool signature for single point cutting tool. **[CO-1, L-U]**
h. Explain fool proofing in locating devices. **[CO-2, L-U]**
i. State applications of modular fixture system. **[CO-3, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Explain merchant's circle diagram with sketch. **[CO-1, L-U]**
b. Describe various types of locators with sketches. **[CO-2, L-U]**
c. Explain design considerations for jigs & fixtures. **[CO-3, L-U]**
d. Differentiate between cutting & non-cutting dies. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Name any two cutting tool materials with their composition & applications. **[CO-1, L-A]**
b. Apply 3-2-1 principle to locate a rectangular work piece. **[CO-2, L-A]**
c. Differentiate between jigs and fixtures. **[CO-3, L-A]**
d. A semicircular component of diameter 30mm & thickness 1mm is to be blanked from a sheet of 50meter length. Calculate the optimum width of sheet required and number of components manufactured. Assume suitable data. **[CO-4, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Draw labelled tool geometry of single point cutting tool. **[CO-1, L-A]**
b. Illustrate any two clamping devices used in machining. **[CO-2, L-A]**
c. Sketch & explain any one fixture used in milling operation. **[CO-3, L-A]**
d. Design a punch and die to make a hole of 50mm diameter in a MS sheet of 2mm thickness. Assume C=5% of thickness. **[CO-4, L-A]**

e. Explain why bending pressure is needed to be computed for a given component. **[CO-5, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain different methods of reducing cutting forces in press tools. **[CO-4, L-A]**

b. Fig.1 shows the cup to be drawn by drawing operation from a given sheet. Take shell dimeter d=120mm; radius of bottom inner corner of shell r=4mm; height of cup h=100mm. Neglect the trimming of blank. Determine diameter of blank, % reduction & number of draws. **[CO-5, L-A]**

c. List the factors considered in design of forging die. Explain any two of them in detail. **[CO-6, L-R]**

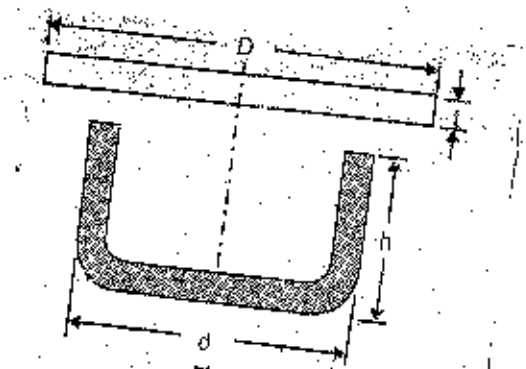


Fig. Q1

*** END ***

EVEN 2025-26

ME23106

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Mechanical Engineering
Course Title : Strength of Material

2:30 Hours / 60 marks Enrolment No. | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define bulk modulus. **[CO-1, L-R]**
b. Define Hooke's law. **[CO-1, L-R]**
c. Define angle of obliquity. **[CO-2, L-R]**
d. State the perpendicular axis theorem. **[CO-3, L-R]**
e. State the term of point of contra flexure. **[CO-4, L-R]**
f. List out types of beam and types of loads. **[CO-4, L-R]**
g. Define core of section. **[CO-5, L-R]**
h. Define eccentric load. **[CO-5, L-R]**
i. State torsion equation with each term. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Calculate the poisson's ratio for a certain material, the modulus of elasticity is 2.8 times its bulk modulus also calculate modulus of rigidity and modulus of elasticity. **[CO-1, L-A]**
b. Determine the planes of maximum shear stress at the point along with its magnitude which is shown in fig.1. Where tensile stress 80MPa, compressive stress 40MPa and shear stress 80MPa acting upon each of these planes. **[CO-2, L-A]**
c. State assumptions made in theory of simple bending. **[CO-3, L-U]**
d. Explain the concept of suddenly applied load. **[CO-6, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. A simply supported beam of span 6m carries a UDL of 3KN/m spread over 2m from left support and point load of 6KN at 4m from left support. Draw SF and BM diagram. **[CO-4, L-A]**
b. Calculate the limit of eccentricity for a rectangular cross-section of size 1000×2000mm. **[CO-5, L-A]**
c. A shaft of 3m length and 75mm diameter is fixed at one end and twisted at free end by a force of 2KN acting at mean radius of a 0.6m. Find the angle of twist. Assume G=90GN/m^2. **[CO-6, L-A]**
d. Describe the method of Moh'r circle to determine principal stress. **[CO-2, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. State principal stresses and their types with expression. Explain each term. **[CO-2, L-U]**

b. Draw the diagram and state MI of centroidal axes i) Hollow circular section ii) Hollow rectangular section. **[CO-3, L-U]**

c. Explain the concept of sign convention in shear force moment and bending moment. **[CO-4, L-U]**

d. Explain the 'Middle third rule'. **[CO-5, L-U]**

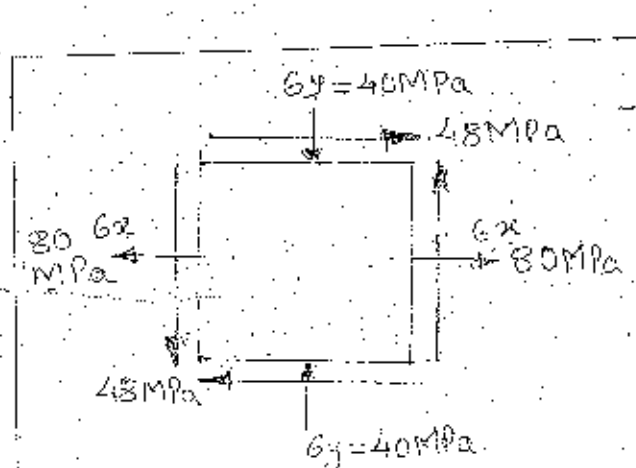
e. An axial pull of 20KN is suddenly applied on a steel bar rod 2.5m long and 1000mm^2 in cross-section. Calculate the strain energy. (E=200GPa). **[CO-6, L-A]**

Q. 5 Attempt any TWO **12 Marks**

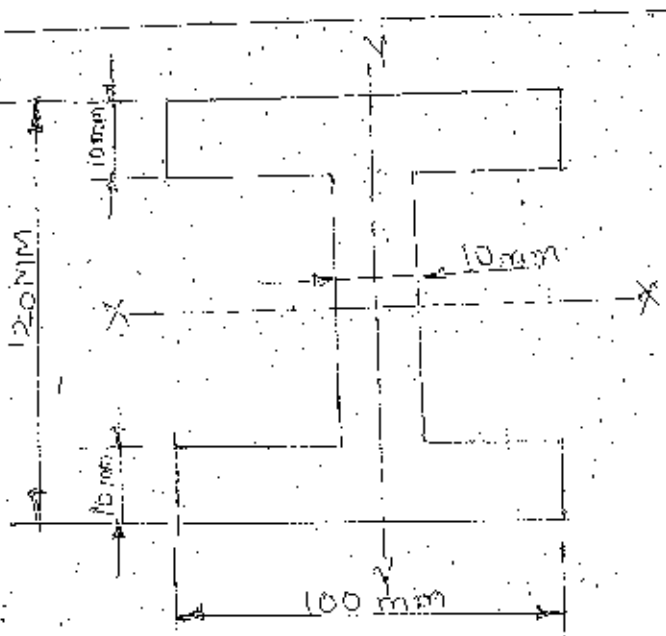
a. Calculate MI of the symmetrical I section of fig.2. Where Flanges = 100mm×10mm
Web = 10mm×100mm. **[CO-3, L-A]**

b. A cantilever beam of 4m long as shown in fig.3. Draw SFD and BMD for this beam. **[CO-4, L-A]**

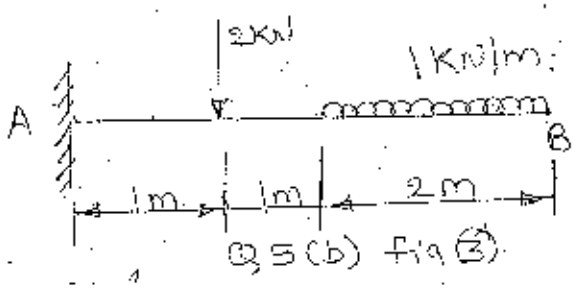
c. a) A column having diameter 200mm of length 4m both ends at the column are hinge. Find Euler's crippling load E=2×10^{5}MPa.
b) Explain stress-strain curve for mild steel with diagram. **[CO-1, L-U]**



Q. 2(b) - fig (1)



Q 5(a) fig (2)



Q 5(b) fig (3)

**** End ****