Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1052
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech) CBC & Grading System (Sem-IV)
Manufacturing Process – II
(Revised)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Question Q. No.01 from section A and Q. No.6 section B is compulsory
2) Attempt any two questions from remaining questions of each section.
3) Figure to the right indicates full marks.

Section A

Q.1 Solve any Five question from the following 10
1) Classify machine tool?
2) Compare advantages and disadvantages of fiat and V-guideways?
3) Define the term Conicity"?
4) What is swing diameter?
5) Write down any four operations performed by a drilling machine?
6) What is meant by "Sensitive hand feed"?

Q.2 1) Explain the Mechanism of chip formation and state the factor affecting the types of chip produced? 08
2) Explain the tooling layout to produce a Hexagonal bolt in a turret lath? 07

Q.3 1) Explain the Working principle of a Jig boring machine with a neat sketch? 08
2) Explain the twist drill nomenclature and define various elements of twist drill? 07

Q.4 1) The following equation for tool life is given for a turning operation $VT^{0.13} f^{0.77} d^{0.37}=C$, A 70 minute tool life was obtained while cutting as V=30m/min, f=0.3mm/rev & d=2.5 mm. Determine the change in tool life if the cutting Speed, feed and depth of cut are increased by 30% individually and taken together? 08
2) With a neat sketch, Explain the construction, working and application of capstan lathe? 07

Q.5 Write short note on 15
1) Power and Energy Relationships in Machining?
2) Cutting parameters in Turning?
3) Machining time calculation in Drilling?

SECTION B

Q.6 Solve any Five question from the following 10

1) Define "Face milling?
2) What is meant by dressing and truing
3) Define the terms abrasive grains
4) How non-traditional machining processes are classified?
5) Enlist the requirement that demands the use of advanced machining process.
6) What is meant by indexing?

Q.7
1. Explain the operations of horizontal broaching machine with neat sketch? 08
2. Explain Surface Grinding with neat Sketch? 07

Q.8
1. Explain Compound indexing and Write down the rule for Compound indexing with example? 08
2. Explain the principle of LBM with neat sketch? 07

Q.9
1. Explain simple indexing in detail and Write down the rule for simple indexing? 08
2. Explain the principle of quick return motion mechanism of a shaper. What is need of this mechanism? 07

Q.10 Write short note 15

1) Universal planer
2) Specifications of Grinding Machines
3) Benefits of Non-Conventional Machining Processes.

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1051
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech/Prod) (Sem-IV)
Theory of Machines-I
[Old]

[Time: Four Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B. i. Attempt any three questions from each section.
ii. Assume suitable data wherever required.

Section A

Q.1 A) Define the following: 04
a) Degrees of freedom
b) Mechanism
c) Kinematic chain
d) Turning pair
B) Explain with neat sketch inversions of four bar chain 09

Q.2 For the inverted slider-crank mechanism shown in fig.1 find the angular velocity of the link QR and the sliding velocity of the block on the link QR. The crank OA is 320 mm long and rotates at 30 rad/s in counter clock wise direction OQ is 650 mm. 13

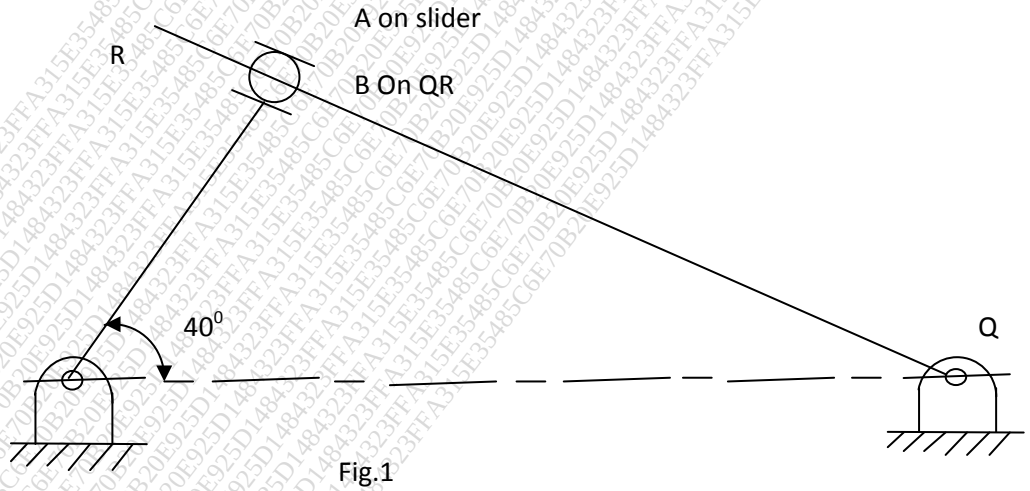


Fig.1

Q.3 Fig.2 shows the configuration diagram of four bar mechanism along with the lengths of links in mm. The link AB has an instantaneous angular velocity of 15 rad/s and a retardation of 26 rad/s^2 in counter clockwise direction Find: 13
i) The angular acceleration of the links BC and CD.
ii) The linear acceleration of the points E, F and G.

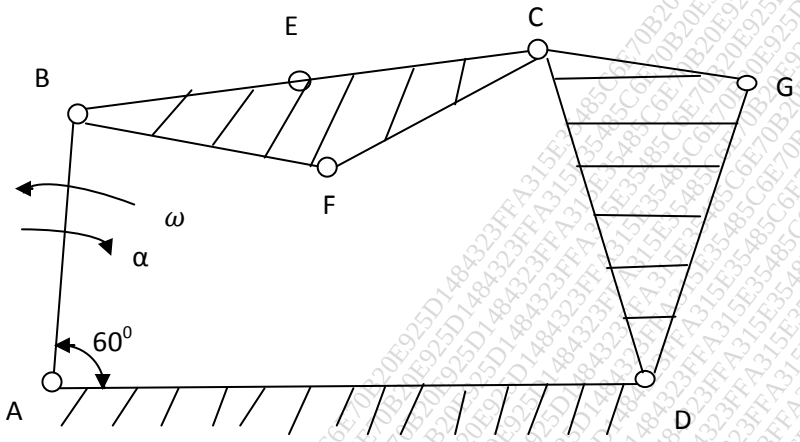


Fig. 2

BE=40
BC=66
AD=100
AB=50
DC=56
DG=44
CF=30
BF=45
CG=24

Q.4 The crank and connecting rod of a reciprocating engine are 80mm and 240mm respectively. The crank is rotating in clockwise direction at 120 rpm. Find with the help of Klein's construction: 13

i) Velocity and acceleration of piston.
ii) Angular velocity and angular acceleration of connecting rod when the crank is at 60^0 from I.D.C. position.

Q.5 The connecting rod of an I.C. engine is 450mm long and has a mass of 2kg. The centre of mass of the rod is 300 mm from the small end and its radius of gyration about an axis through this centre is 175mm. The mass of piston and the gudgen pin is 2.5kg and the stroke is 300mm. The cylinder diameter 115mm. Determine the magnitude and the direction of the torque applied on the crank shaft when the crank is 40^0 and the piston is moving away from inner dead centre under an effective gas pressure of 2 N/mm^2. The engine speed is 1000 rpm. 14

Section B

Q.6 a) Discuss the effectiveness of band brake under various conditions. 06

b) Explain with a sketch prony brake dynamometer. 07

Q.7 A band and block brake has 10 blocks and each block subtends an angle of 15^0 at the centre of the wheel. Two ends of the band are fixed to pins on the opposite sides of the brake fulcrum at distance of 40mm and 200mm from it. Determine the maximum force required to be applied on the lever at a distance of 300mm from the fulcrum to absorb 250 KW of power at 280 rpm. The effective diameter of drum is 840mm. Take $\mu = 0.35$ 13

Q.8 Draw the profile of cam when the roller follower moves with cycloidal motion as given below: 13

a) Outstroke with maximum displacement of 44mm during 180^0 of cam rotation
b) Return stroke for the next 150^0 of cam rotation
c) Dwell for the remaining 30^0 of cam rotation

The minimum radius of cam is 20 mm and the diameter of roller is 10mm. The axis of the roller follower passes through the cam shaft axis.

Q.9 A shaft carries live masses A, B, C, D and E which revolve at the same radius in planes which are equidistance from one another. The magnitude of masses in the planes A, C and D are 50kg, 40kg and 80kg respectively. The angle between A and C is 90^0 and that between C and D is 135^0. Determine the magnitude of the masses in the planes B and E and their angular positions to put the shaft in complete rotating balance. 13

Q.10 The pistons of a 60^0 twin V-engine has strokes of 120mm. The connecting rods driving a common crank has a length of 200mm. The mass of the reciprocating parts per cylinder is 1kg and the speed of crank shaft is 2500rpm. Determine the magnitude of the primary and secondary forces 14

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1077
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech/Prod) (Sem-IV)
Metrology & Mechanical Measurement
[Old]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Q.No.1 and Q.No.6 are compulsory. Attempt any two questions from remaining from each section.
2) Use separate answer book for each section.
3) Draw the sketches wherever required.

Section A

Q.1 Answer any five questions from following: 10
- i) Enlist the gauges used for vacuum pressure measurement
- ii) Differentiate between sensitivity and range
- iii) What is Hysteresis?
- iv) Define the term span in measurement
- v) Enlist various types of transducer.
- vi) What is response time?

Q.2
a) Analyze the bourdon tube pressure gauge as the generalized measurement system. Identify the various elements and point out the function performed by each element. 08

b) Elaborate the significance of calibration process of measuring instrument. 07

Q.3
a) What do you mean by low pressure measurement? Explain with a neat sketch measurement of low pressure by Pirani Gauge 08

b) Explain load cell with neat sketch. 07

Q.4
a) Describe thermistor with neat sketch. 08
b) Explain frequency measurement by direct comparison method. 07

Q.5
a) Discuss various types of errors. 08
b) Discuss static characteristics of measuring devices. 07

Section B

Q.6 Attempt any five of the following: 10
- a) Define Metrology list out the objective of Metrology
- b) Enlist different types of gear error
- c) Define the term primary texture
- d) What is wavelength standard?

e) Enlist any four linear measuring instruments.
f) State the limitations of sine bar

Q.7 a) Describe with the help of a neat sketch angle dekkor. 08
b) Explain floating carriage micrometer in detail. 07

Q.8 a) Describe with the help of a neat sketch use of angle gauges. 08
b) Explain with a neat sketch how a vernier height gauge is used for measurement. 07

Q.9 a) Explain with a sketch the working principle of optical comparator. 08
b) Explain in detail any one of the equipment use for surface finish measurement. 07

Q.10 a) Explain in detail difference between the line standard & end standard 08
b) Describe in detail tool maker's microscope 07

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1078
FACULTY OF SCIENCE AND TECHNOLOGY
S Y B.Tech. (Mech.) CBC & Grading System (Sem IV)
Applied Thermodynamics
[Revised]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Assume suitable data, if necessary.
ii) Q.No.1 and Q.No.6 are compulsory.
iii) Solve any two questions from remaining in each section.
iv) Use steam table is permitted.

Section A

Q.1 Solve any FIVE of the following. 10
a) Classify Solid and Liquid fuels?
b) Define Combustion?
c) Define Boiler efficiency?
d) Classify Draught?
e) Write the engineering applications of nozzle?
f) Classify condenser?

Q.2 a) The gravimetric analysis of a coal gives 87% carbon, 3% hydrogen, 4% moisture, and 6% ash. Actual air supplied is 15 kg/kg of coal. Determine the theoretical amount of air required if 80% of carbon is burned to CO_2 and remaining to CO. also determine the excess air supplied. 08

b) Explain with suitable neat sketch Boy's gas Calorimeter? 07

Q.3 a) Determine the air-fuel ratio for an oil fired steam with the following data: 08
Chimney height = 40m
Draught = 25 mm of water column
Mean chimney gas temperature = 367°C
Ambient outside temperature = 20°C
Also calculate the velocity of the flue gases

b) Prove that the draught produced in mm of water by a chimney, is given by 07

$$h = 353H\left(\frac{1}{T_1} - \frac{m+1}{mT_2}\right) mm\ of\ water$$

Q.4 a) Derive the expression of critical pressure ratio, 08

$$\frac{P_2}{P_1} = \left(\frac{2}{n+1}\right)^{\frac{n}{n-1}}$$

According to the law $pv^n = C$ where n is the index of expansion.

b) Find the weight of cooling water required in the surface condenser of a 3000 kW steam power plant from the following data: 07
Steam used = 10kg/kWh
Exhaust steam condition = 0.9 dry
Pressure in the condenser = 0.1 bar
Hot well temperature = 32°C
Cooling water inlet temperature = 25°C
Cooling water outlet temperature = 32°C
Temperature of steam at entrance = 40°C
What will be the vacuum efficiency?

Q.5 Solve any THREE of the following. 15
a) Explain why excess air is used in burning of fuels?
b) Explain how atmospheric conditions and air supplied for combustion affect natural draught?
c) What are the advantages of forced draught system over induced draught system?
d) Describe the factors affecting the efficiency of condensing plant.

Section B

Q.6 Solve any FIVE of the following. 10
a) Draw P-V and T-S diagram of Carnot cycle?
b) Define work ratio?
c) Write the assumptions of air standard cycle?
d) Draw P-V and T-S diagram of Dual cycle?
e) Define compression ratio?
f) What are the uses of compressed air?

Q.7 a) A steam turbine supplied with steam at a pressure of 85 bar and 450°C. The steam is reached to its original temperature in a reheater at 10 bar. The expansion then takes place at condenser pressure of 0.08 bar. Find the efficiency of the reheat cycle and the work output if the flow of steam is 1kg/s. Consider the pump work and assume that the expansion in the turbine is isentropic. 08

b) Explain with suitable neat sketch Regenerative Rankine Cycle? 07

Q.8 a) In an air standard dual cycle the compression ratio is 12 and the maximum pressure in the cycle is 70 bar. The lowest pressure and temperature of the cycle are 1 bar and 300 K. Heat is added during constant pressure process up to 3% of the stroke. Taking diameter at 25 cm and stroke as 30 cm. Determine: the pressure and temperature at the end of the compression, the thermal efficiency, and the mean effective pressure. 08
Assume, Cp = 1.005kJ/kg K, Cv = 0.718 kJ/ kg K, and $\gamma = 1.4$

b) With help of P-V and T-S diagram derive an expression for Diesel Cycle? 07

Q.9 a) A single cylinder double acting air compressor sucks in air at the rate of 5 m^3/min. at a pressure of 100 kPa and 25°C. It delivers air to the receiver at a pressure of 6 bar. The speed of the compressor is 250 rpm, and stroke is 1.5 times the cylinder diameter. Neglect the effect of clearance and if the law of compression is $PV^{1.28}$=C, find, cylinder dimensions, indicated power of the compressor, the shaft power if the mechanical efficiency is 90%. 08

b) Prove that the work done per kg of air in a compressor is given by 07

$$W = \frac{n}{n-1} RT_1 \left[\left(\frac{P_2}{P_1} \right)^{\frac{n-1}{n}} - 1 \right]$$

Q.10 Solve any THREE of the following. 15

a) Explain the factors affecting the efficiency of Rankine cycle?
b) In practice which engine, diesel or petrol is more efficient? Explain why?
c) Comparison of Otto, Diesel, and Dual cycle?
d) Explain perfect and imperfect intercooling.

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1123
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech./Prod) (Sem-IV)
Manufacturing Processes-II
[Old]

[Time: Three Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B 1) Q.1from section A & Q.6 from section B are compulsory.
2) Solve any two questions from each section other than Q no 1 & Q. no 6
3) Figures to the right indicate full marks.

Section A

Q.1 Attempt any Five 10

1. Cutting fluids mostly used for machining steel is……..
   a) Soluble oil
   b) Water
   c) Heavy oil
   d) Dry

2. As the cutting speed increase tool cutting forces…….
   a) Increases
   b) Decreases
   c) Remains constant

3. To reduce the wear of tool on harder material it should be machined at ----------.
   a) Lower cutting speed & higher feed;
   b) Higher cutting speed & lower feed;
   c) Lower cutting speed & smaller feed;

4. A flat surface can be produced by a lathe machine, if the cutting tool moves…….
   a) Perpendicular to the axis of rotation of workpiece
   b) Parallel to the axis of rotation of workpiece
   c) At an angle of 45 degree

5. ……..is used for holding bored parts for machining their outside surfaces on Lathe:
   a) Angle plate
   b) Mandrel
   c) Driving plate
   d) Dogs

6. The process of beveling sharp ends of a workpiece is called as….
   a) Knurling
   b) Facing
   c) Chamfering
   d) Grooving

7. A left hand tool on a lathe cuts most efficiently when it travels
   a) From left to right end of the lathe bed
   b) From right to left end of the lathe bed
   c) With the help of a compound slide
   d) Across the bed

Q.2 a) What are the three basic categories of material removal processes? Explain in details 08
b) Explain various types of chips with neat sketches 07

Q.3 a) With the help of a line diagram, describe the gear mechanism of an engine lathe 08
b) Name different methods of taper turning? Describe these methods using neat sketches 07

Q.4 a) Define the following terms used in lathe operation 08
   i) Cutting speed
   ii) Feed
   iii) Depth of cut
   iv) Machining time
b) Name the different types of the lathes available in machine shop? Describe the working of a center lathe 07

Q.5 a) Explain the construction and working of Horizontal Boring Machine 08
b) Sketch a twist drill and name its different parts. 07

Section B

Q.6 Attempt any five 10

1. Down milling is also called
   a) Face milling
   b) End milling
   c) Climb milling
   d) Conventional milling

2. The process of removing materials in the form of chips from a workpiece by mechanical action of many small abrasive particles bonded together in a wheel is called as……
   a) Turning
   b) Grinding
   c) Milling
   d) Broaching

3. The process of removing metal by a milling cutter, which is rotated against the direction of the feed of the workpieces……..
   a) Face milling
   b) Up milling
   c) End milling
   d) Down milling

4. In unconventional Machining process, tool material must be harder than workpiece material……..
   a) True
   b) False

5. The process to expose fresh cutting action by removing glaze or adhesion particles is called by……
   a) Clearing
   b) Dressing
   c) Turning
   d) Facing

6. In ultrasonic machining, the material is removed by…..
   a) Anodic dissolution
   b) Thermal melting
   c) Abrasive action
   d) Electrochemical oxidation

7. In Electron beam machining, workpiece is held in……
   a) Vacuum clamber
   b) Dielectric medium
   c) Electrolyte

Q.7	a)	How does a universal milling machine differ from a conventional knee-and-column machine?	07
	b)	Define the following terms used in milling operation a) Cutting speed b) Feed c) Depth of cut d) Machining time	08
Q.8	a)	With the help of sketch explain the center-less grinding operation	08
	b)	Explain construction and working of planer machine	07
Q.9	a)	Explain Laser beam machining	07
	b)	What are the different types of grinding machines? Explain one in details	08
Q.10	a)	Explain principal parts of shaper	08
	b)	Explain electro discharge machining. Also state its applications	07

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1124
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech.).CBC & Grading System (Sem-IV)
Elective-I
Alternative Energy Sources
[Revised]

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Assume suitable data, if necessary.
ii) Question No. 1 and Question No.6 are compulsory.
iii) Solve any **TWO** questions from remaining in each section.
iv) Figures to the right indicate full marks.

Section A

Q.1 **Attempt any FIVE of the following:** 10

a) Define solar constant?
b) Application of wind energy?
c) List the important properties of gaseous fuels?
d) Explain the process of photosynthesis and its necessary conditions?
e) Classify the availability of energy resources?
f) Difference between biomass and biogas?

Q.2
a) Difference between renewable and non-renewable energy sources. 08
b) What are the renewable energy potential available and exploited on environment? 07

Q.3
a) Explain the following terms with suitable neat sketch. 08
i. Parabolic trough collector
ii. Concentrating Type
iii. Receiver Pipe
iv. Flat plate collector with adjustable mirror

b) Explain with suitable neat sketch: 07
i. Solar water heating
ii. Solar distillation

Q.4
a) Enumerate the factor which should be given due consideration while selecting the site for wind energy conversion systems (WECS). 08
b) With suitable neat sketch explain solar water pumping. 07

Q.5 Write short notes on the following: 15

a) Energy policy of India.
b) Compare flat-plate and concentrating collector.
c) Barriers in implementation of renewable energy system.

Section B

Q.6 **Solve any FIVE of the following:** 10

a) Classify the MHD systems.
b) Enlist the bio-mass resources.
c) Discuss the application of biogas.
d) What is a thermo ionic convertor?
e) Gasifier and enlist its application.
f) What do you understand by tidal energy?

Q.7
a) Define Magnetic hydrodynamics and what is the principle of MHD power generation? 08
b) Explain with suitable neat sketch construction and working of thermo ionic generators. 07

Q.8
a) With suitable neat sketch explain single basin and double tidal plants. 08
b) What are the environmental problems associated with geothermal energy? 07

Q.9
a) Classify the biogas plants? Explain briefly the main components of biogas plants? 08
b) Classify tidal power plant? Explain the components of a tidal power plant? 07

Q.10 Write short notes on the following: 15

a) Energy consumption as a measure of prosperity.
b) Green Houses Gases.
c) Important aspects of geothermal energy.

Total No. of Printed Pages:03

SUBJECT CODE NO:- H-1125
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech.) CBC & Grading System (Sem-IV)
Elective-I
Advanced Solid Mechanics
[Revised]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
i. Question no. 1from section A and Question no. 6 from section B are compulsory.
ii. Solve any two questions from remaining from each section.
iii. Assume additional data if required.
iv. Uses of non-programmable calculate is allowed.

Section A

Q.1 Attempt any five of the following 10

a. What do you understand by hydrostatic and deviatoric stresses?
b. Define shear center and shear flow.
c. Define octahedral stress and principle stress.
d. Give the classification of materials based on elasticity?
e. Define the terms: Isotropic and Anisotropic materials.
f. Write Euler's buckling load formula.

Q.2 A) The state of stress at a point is such that $\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yz} = \tau_{zx} = \rho$. Determine the principle stresses and their directions At a point P. The rectangular stresses components are $\sigma_x = 1, \sigma_y = -2, \sigma_z = 4, \tau_{xy} = 2\ \tau_{yz} = -3,\ \tau_{zx} = 1$ all units in kPa. Find the principle stresses and check for invariance. 10

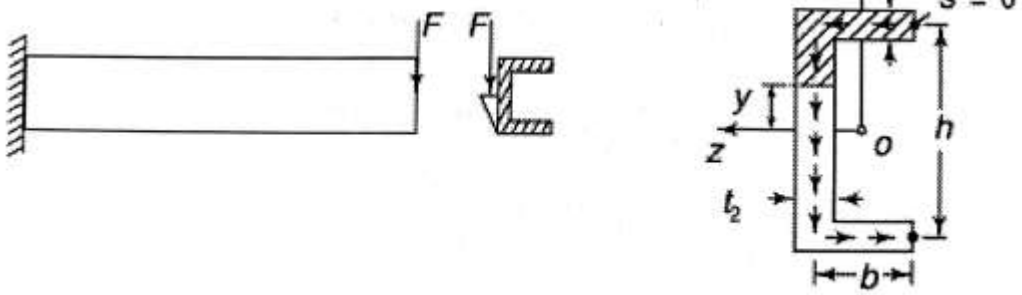
B) Write a note on Mohr's circle for three dimensional state of stress. 05

Q.3 A) The state of stress at a point is characteristics by the components $\sigma_x = 100\ MPa,\ \sigma_y = -40\ MPa,\ \sigma_z = 80\ MPa\ ,\ \tau_{xy} = \tau_{yz} = \tau_{zx} = 0$ .Determine the extremum value of the shear stresses, their associated normal stresses, the octahedral shear stress, and its associated normal stress. 10

B) Explain the state of pure shear using six rectangular stress components. 05

Q.4 Determine the shear stress distribution in a channel section of a cantilever beam subjected to a load F, as shown in figure. Also, locate the shear center of the section. 15

Code No
Date of Examination



Q.5 Write a short note on: 15

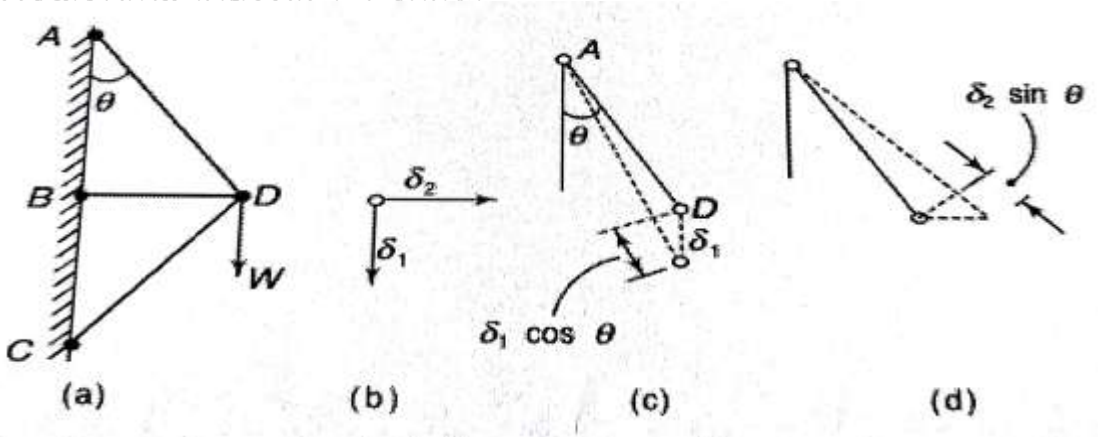
i) Orthotropic Material
ii) Transversely Isotropic Material
iii) Anisotropic Material.

Section B

Q.6 Attempt any five of the following 10

a. State the principle of superposition. Explain it in short.
b. Explain the Kirchoff's Theorem in short.
c. Explain the maximum principle stress theory.
d. Explain the maximum shear stress theory.
e. Define the terms: isoclinics and isochromatics
f. Write the advantages of nondestructive test techniques.

Q.7 Three elastic members AD, BD and CD are connected by smooth pins, as shown in figure. All the members have the same cross-sectional areas and are of the same material. BD is 100 cm long and members AD and CD are each 200 cm long. What is the deflection of D under load W? 15



Q.8 State and prove the first theorem of Castigliano's. 15

Q.9 A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. if the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to- 15

1. The maximum principle stress;
2. The maximum shear stress; and
3. The maximum distortion strain energy theory of yielding.

Q.10 A) Explain strain gauge rosettes and their types. 08

B) Explain the working of Plane Polariscope with a neat sketch. 07

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1160
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech/Prod) (Sem IV)
Electrical Technology
[Old]

[Time: Two Hours] **[Max. Marks:40]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 from section A and Q.No.5 from section B are compulsory.
ii) Solve any two from remaining questions from each section.
iii) Assume suitable data, if required.

Section A

Q.1 Attempt any four of the following: 08
a) Induction motor always runs less than….speed and never runs at ……speed.
b) DC shunt motors are called practically constant speed motor why?
c) Why armature of DC Machine is laminated?
d) List the types of DC Motors?
e) What is speed of Magnetic field in three phase induction motor?
f) Draw Torque/Armature current characteristics for DC Shunt Motor.

Q.2 a. Explain effect of armature reaction in DC generator. 03
b. Draw the characteristics for DC series motors. 03

Q.3 a. With neat sketch explain the construction of DC motors. 03
b. A 4 pole DC generator is delivering 20 A to a load of 10 ohms. If the armature resistance is 0.5 ohms & the shunt field resistance is 50 ohms, calculate the induced EMF & the efficiency of the machine. 03

Q.4 a) With a block diagram explain the power stages in 3-phase induction motor. 03
b) Draw the Slip/torque characteristics for three phase Induction Motor. 03

Section B

Q.5 Attempt any four from the following. 08
a) Write two applications of shaded pole single phase induction motor.
b) What is the function of the centrifugal switch in single phase induction motor?
c) Why stepper motors are used in Robotics (write special features)
d) What is the phase between secondary voltages compared with supply voltage?
e) List the types of connections for three phase transformers.
f) What are the components of primary current when secondary is open at no load.

Q.6 a) Why single phase induction motors are not self-started? How they made self-started? 03
b) What is stepper motor? Define the step angle for the same. 03

Q.7	a)	Explain the construction and working of VR stepper motor.	03
	b)	What is the function of centrifugal switch in single phase induction motor.	03
Q.8	a)	Explain with neat circuit diagram Delta/Delta connection for three phase transformer. What are the demerits of this connection?	03
	b)	Write note on Torque developed in single phase Induction Motor?	03

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-1161
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech.) CBC & Grading System (Sem-IV)
Electrical Technology
[Revised]

[Time: Two Hours] **[Max.Marks: 40]**

Please check whether you have got the right question paper.

N.B
i. Question no 1 from section A and Question no 5 from section B are compulsory
ii. Solve any two from remaining questions from each section.
iii. Assume suitable data, if required.

Section A

Q.1 Attempt any FOUR of the following: 08
a) What are the types of 3-phase induction motors?
b) What is the function of Hold On Coil and Over load relay in 3-point starter of DC shunt motor.
c) When the rotor of a 3-phase induction motor is blocked, the slip is…..
d) What is armature reaction?
e) List the various types of DC generators with circuit diagrams.
f) State two applications of DC shunt motor

Q.2 a) Explain with neat sketch 3-point starter for DC shunt motor. 03
b) Explain the concept of back EMF in DC motor. 03

Q.3 a) Write the condition for maximum power in DC motor. 03
b) Derive an expression for the starting torque of an induction motor. 03

Q.4 a) Draw & explain the power flow diagram for a dc motor. 03
b) What is the condition for maximum starting torque of 3-phase induction motor? 03

Section B

Q.5 Solve any FOUR from following. 08
a) Draw circuit diagram for capacitor start capacitor run single phase induction motor.
b) Write applications of variable reluctance stepper motor?
c) What is postulating torque in case of single phase induction motor?
d) What is principle of working of three phase transformer?
e) Draw circuit diagram for Star/Star connected three phase transformer.
f) Generally insulated laminations are used for the core of electrical machines. Why?

Q.6 a) Explain double field revolving theory for single phase motor. 03
b) Explain with neat sketch variable reluctance stepper motor. 03

Q.7	a)	Draw a circuit diagram for capacitor start single phase induction motor.	03
	b)	Classify stepper motor & explain any one of them.	03
Q.8	a)	Explain with neat circuit diagram Delta/ Delat connection for three phase transformer. Mention the merits and demerits of this connection.	03
	b)	Explain shaded pole single phase induction motor?	03

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1206
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech/Prod) (Sem-III)
Fluid Mechanics
[OLD]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Q. No.01 from Section A and Q. No.06 from section B are compulsory and solve any two questions from remaining from each section.
2. Assume additional data if required.
3. Use of non-programmable calculator is allowed.

SECTION – A

Q.1 **Solve the following questions (Any five)** 10
- (i) Enlist any four properties of fluid
- (ii) State the Archimedes' principle
- (iii) Give any two example of capillary effect
- (iv) Define stream function.
- (v) Define mass density and specific volume
- (vi) Enlist different pressure measuring devices

Q.2 (a) A caisson for closing the entrance to a dry dock is of trapezoidal from 16 meter wide at the top and 10 meter wide at the bottom and 6 meter deep. find the total pressure and centre of pressure of the caisson, if the water on the outside is slot level with the top and dock is empty. 08

(b) Explain with neat sketch U tube manometer to measure system pressure above and below atmospherics. 07

Q.3 (a) If for two dimensional potential flow the velocity potential is given by $\emptyset = x\,(2y - 1)$, Determine the velocity at point P (4,5), Determine also the valve of stream function ψ. 08

(b) Differentiate between 07
- (i) Laminar flow and Turbulent flow.
- (ii) Potential and irrotational flow

Q.4 (a) Explain Newton's law of viscosity. Differentiate between Newtonian and Non Newtonian fluid. 07

(b) A 90N rectangular solid block slides down a 30°inclide plane. The plane is lubricated by a 3mm thick film of oil of specific gravity 0.85 and viscosity 8.5 poise. If the contact area is 0.35 m^2 estimate the terminal velocity of block. 08

Q.5 **Write short note (any three)** 15
- (i) Types of flows
- (ii) Velocity potential function & stream function.
- (iii) Types of fluids.
- (iv) Metacentric height

(v) Equilibrium of floating bodies.

SECTION – B

Q.6 **Solve the following questions (Any five)** 10

(i) What are measure and minor losses in pipes?
(ii) State Bernoulli's theorem for real fluid.
(iii) What are assumptions made in Euler's theorem?
(iv) Define displacement thickness.
(v) Define the term Boundary layer.
(vi) Define Compound pipe.

Q.7 (a) Explain with neat sketch venturimeter and state their merits and demerits. 07

(b) And orifice diameter 15 cm is inserted in a pipe of diameter 30 cm. The pressure difference measured by a mercury oil differential manometer on the two sides of orifice meter gives reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when coefficient of discharge of meter is 0.64 08

Q.8 (a) Obtain expression for head loss in a sudden expansion in the pipe. 07

(b) Two tanks are connected with the help of two pipes in series. The length of pipe are 1000 met and 800 met whereas diameters are 400mm and 200mm respectively the coefficient of friction for both the pipes is 0.008. The difference of water level in tank is 15 meter. Find the rate of flow of water considering all losses. 08

Q.9 (a) Define displacement thickness and derive expression for displacement thickness. 07

(b) Find the displacement thickness, the momentum thickness for the velocity distribution in the boundary layer is given by 08

$$\frac{u}{U} = 2\,(y/\delta) - (y/\delta)^2$$

Q.10 **Write short note (any three)** 15

(i) Boundary layer separation
(ii) Compound pipe
(iii) Venturimeter
(iv) Equivalent pipe
(v) Water Hammer

Total No. of Printed Pages:03

SUBJECT CODE NO:- H-1207
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech) (Sem-III)
Fluid Mechanics
[Revised]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1. Question No. 01 from section A and Q.No.06 from section B are compulsory and solve any two questions from remaining from each section.
2. Assume additional data if required.
3. Use non programmable calculator is allowed.

Section A

Q.1 Solve the following question (Any five): 10
a) Define dynamic viscosity and derive its unit.
b) Differentiate between ideal fluid and real fluid.
c) Define centre of pressure and total pressure.
d) Define stream function.
e) State buckingham π theorem.
f) Define man density and weight density.

Q.2
a. What is manometer? How they are classified, explain with neat sketch differential manometer. 07
b. A stream function is given by $\psi = 5x - 6y$.
Calculate velocity components and also magnitude and direction of resultant velocity 08

Q.3
a. Define an orifice meter, prove that discharge through orifice meter is given by relation: 08

$$Q = cd.\frac{a_0 a_1}{\sqrt{a_1{}^2 - a_0{}^2}} \times \sqrt{29h}$$

a_1 = area of pipe, a_0 = area of orifice.

b. A horizontal venturimeter with inlet and throat diameter 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine rate of flow take cd= 0.98. 07

Q.4
a. Find an expression for the drag force on smooth sphere of diameter D, moving with uniform velocity V in a fluid of density ϱ and dynamic viscosityμ. 08
b. Explain the term dimensionally homogeneous equation. 03
c. What do you mean by fundamental and derived unit? 04

Q.5 Write short note (any three): 15

i) Computational fluid dynamics.
ii) Pressure measuring devices.
iii) Type of similarities.
iv) Metacentric height.
v) Application of flow net.

Section B

Q.6 Solve the following questions (Any Five): 10

i) Enlist minor losses in pipes.
ii) What do you mean by equivalent pipe.
iii) Define displacement thickness.
iv) Define compressible and incompressible fluid.
v) Define the term boundary layer.
vi) Enlist different hydraulic coefficients.

Q.7 a) Prove that momentum thickness for boundary layer flow are given by 07

$$\theta = \int_0^d \frac{u}{v}\left[1 - \frac{u}{v}\right] dy$$

b) Air is following over a smooth plate with a velocity of 10 m/sec. the length of plate is 1.2 met and width 0.8 met. If laminar boundary layer exists up to a value of $Re = 2 \times 10^5$, find the maximum distance from the leading edge upto which laminar boundary layer exists. Find the maximum thickness of laminar boundary layer it velocity profile given by 08

$$\frac{u}{v} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$$

Take kinematic viscosity of air = 0.155 takes

Q.8 a) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for first parallel pipe are 2000 met and 1 met respectively while the length and diameter of second parallel pipe are 2000 met and 0.8 met. Find the rate of flow in each parallel pipe. If the total flow in the main is $3m^3/sec$. the coefficient of friction for each parallel pipe is 0.005 08

b) What is compound pipe? What will be loss of head when pipes are connected in series? 07

Q.9 a) Define mach number, What is significance of mach number in compressible fluid flow? 07

b) What is equivalent pipe? Derive expression for Dupuit's equation for equivalent size of pipe. 08

Q.10 Write a short note on (Any three) : 15

i) Drag and lift force.

ii) Turbulent velocity profiles.

iii) Major and minor losses in pipes.

iv) Boundary layer separation.

v) Compressibility of fluid.

Total No. of Printed Pages:4

SUBJECT CODE NO:- H-1240
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech/Prod) (Sem-III)
Strength of Materials
[Old]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1. Q.No.1 from section A and Q.No.6 from section B are compulsory.
2. In all attempt three questions from Section A and three questions from Section B.
3. Figures to the right indicate full marks.
4. Assume suitable data, if and wherever necessary.

Section A

Q.1 Answer any five from the following: 10

a) Define point of contraflexure? How many points of contraflexure are there for simply supported beam overhanging at one end?
b) Define thermal stress and thermal strain.
c) Draw the Shear Force and Bending Moment diagram for a cantilever of length L carrying a point load W at the free end
d) Define principal stress and strain
e) What do you mean by simple bending or pure bending
f) What are the different types of beams? Differentiate between a cantilever at a simply supported beam
g) What is the principle of superposition?

Q.2 A simply supported beam of length 5m, carries uniformly increasing load of 800 N/m run at one end to 1600 N/m run at the other end as shown in the fig.1. Draw the Shear Force and Bending Moment diagram for the beam. Also find the position and magnitude of the maximum bending moment. 15

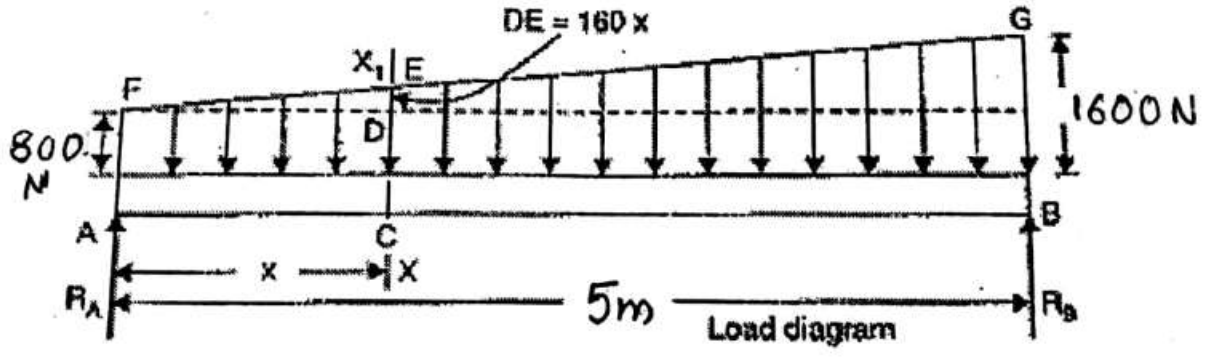


Fig. 1

Q.3 a) An axial pull of 35000 N is acting on a bar consisting of three lengths as shown in the fig.2. If the young's modulus is $E = 2.1 \times 10^5\ N/mm^2$. determine: 12

i) Stresses in each section and

ii) The total extension of the bar

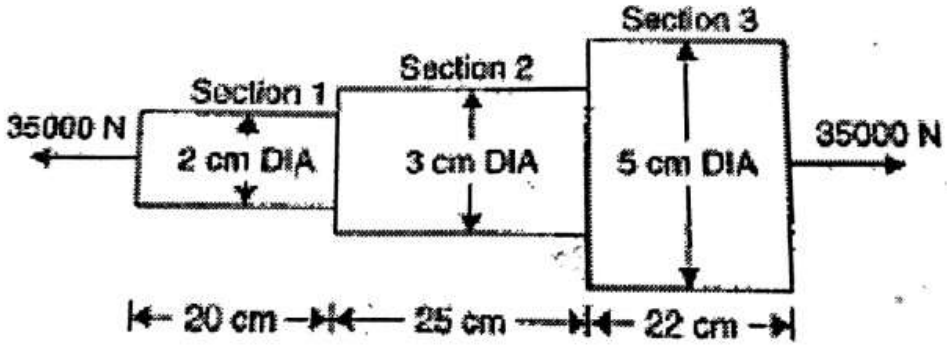


Fig. 2

b) Explain the stress strain curve for the brittle material. 03

Q.4 A cast iron beam of I-section is shown in the fig.3. The beam is simply supported on a span of 5m. If the tensile stress is not to exceed$20\ N/mm^2$, find the safe uniform load which the beam can carry. Also find the maximum compressive stress. 15

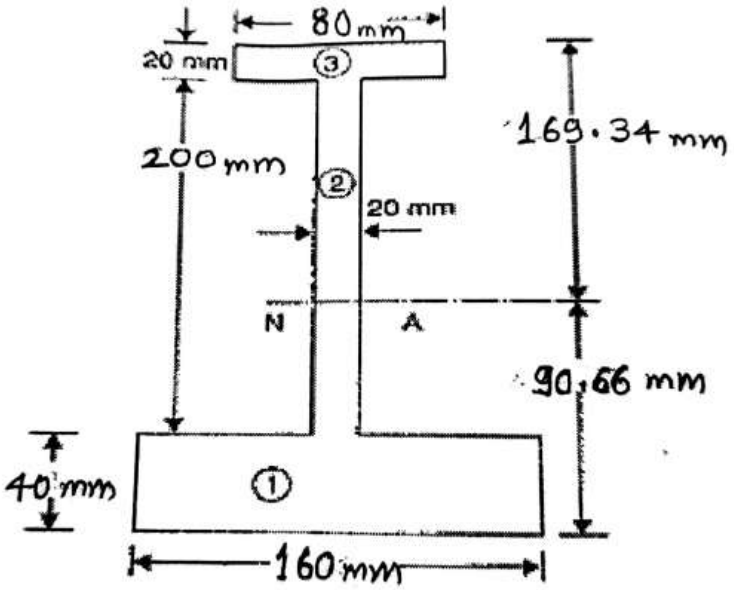


Fig. 3

Q.5 a) For the section shown in the fig.4. Determine the average shearing stresses A,B,C and D for a shearing force of 20 KN. Draw also the shear stress distribution across the section. 12

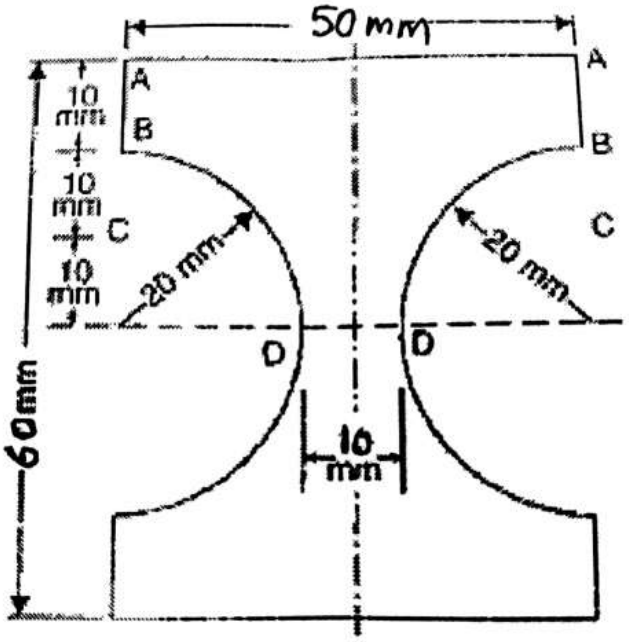


Fig.4

b) Calculate the increase in length of a steel bar, $100\ mm \times 12\ mm$ in cross section and 3 mm long. If subjected to an axial pull of 30 KN. Take the modulus of elasticity of the steel as 210 GPa. 03

Section B

Q.6 Answer <u>any five</u> from the following: 10

a) Define polar moment of inertia.
b) What do you mean by "Middle third rule for rectangular sections"
c) What is the slenderness ratio for a column hinged at both ends of length L and at least radius of gyration 'K'
d) Explain the difference between direct stress and bending stress
e) Define hoop stress and give its value for thin cylinder of diameter 'D'
f) What is the value of modulus of section of hollow circular shaft
g) State the assumptions in the theory of torsion.

Q.7 A solid circular shaft and hollow circular shaft whose inside diameter is three fourth of the outside diameter, are of the same material, of equal length and are required to transmit a given torque. Compare the weights of these two shafts if the maximum shear stress developed in the two shafts are equal. 15

Q.8 A beam of length 5m and of uniform rectangular section is simply supported at its ends. If carries a uniformly distributed load of 9kN/m run over the entire length. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and Central deflection is not to exceed 1 cm. take $E = 1 \times 10^4 N/mm^2$ for the beam material. 15

Q.9 A cylindrical vessel of 1.5 m diameter and 4 m long is closed at ends by rigid plates. It is subjected to an internal pressure of 3 N/mm^2. If the maximum principal stress is not to exceed 150 N/mm^2 , find the thickness of the shell. Take $E = 2 \times 10^5 N/mm^2$ and poisons ratio $\mu = 0.3$. Find the changes in the diameter, length and volume of the shell. 15

Q.10 a) Derive an expression for the shear stress produced in the circular shaft which is subjected to torsion? What are the assumptions made in the derivation? 09

b) Differentiate between circumferential and longitudinal stresses in the thin cylinder. 06

Total No. of Printed Pages:05

SUBJECT CODE NO:- H-1241
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech) (Sem-III)
Strength of Materials
[Revised]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

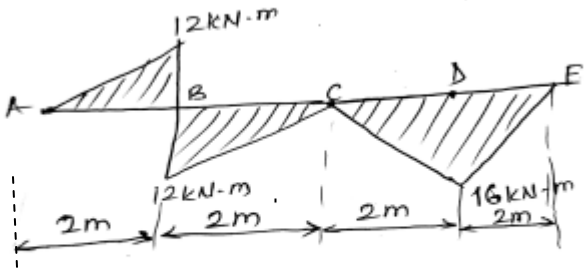
N.B
1) Question no. 1 from Section A and Question no. 6 from Section B are compulsory and solve any two questions from remaining from each Section.
2) Assume additional data if required.
3) Use of non-programmable calculator is allowed.

Section A

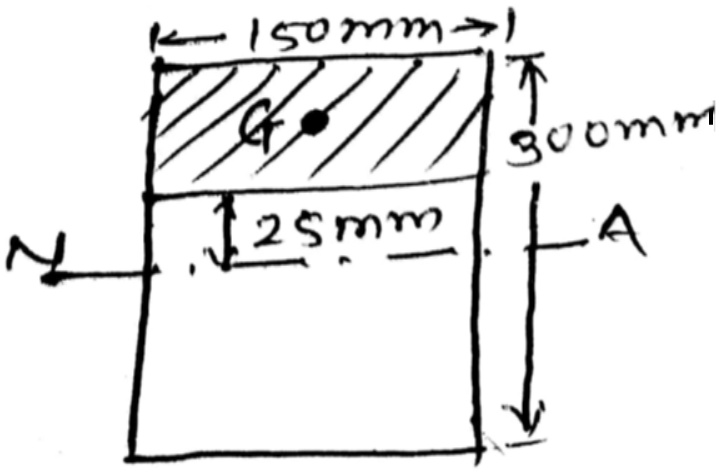
Q.1 Attempt any five of the following:- 10

a) Define the term: Hardness and Toughness.
b) Draw the stress-strain diagram for the brittle material.
c) State the Mohr's theorem for moment area method.
d) State and explain the Hooke's Law.
e) What do you mean by thin cylinder?
f) Give the Sign Conventions for shear force and bending moment diagram.

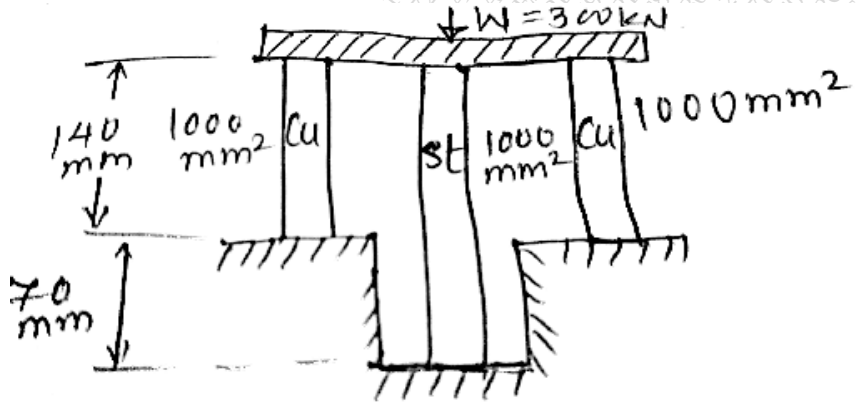
Q.2 a) Bending moment diagram for a beam is shown in figure. Draw load diagram and shear force diagram. 09



b) A rectangular beam 150 mm wide and 300 mm deep is subjected to a maximum shear force of 80 kN. Determine: 06
i) Average shear stress
ii) Maximum shear stress
iii) Shear stress at a distance 25 mm above the neutral axis.



Q.3 a) Two copper rods and one steel rod together support a load of 300 kN as shown in figure. Find the stresses in the rods. $E_s = 200\ GPa$ & $E_c = 100\ GPa$. 07



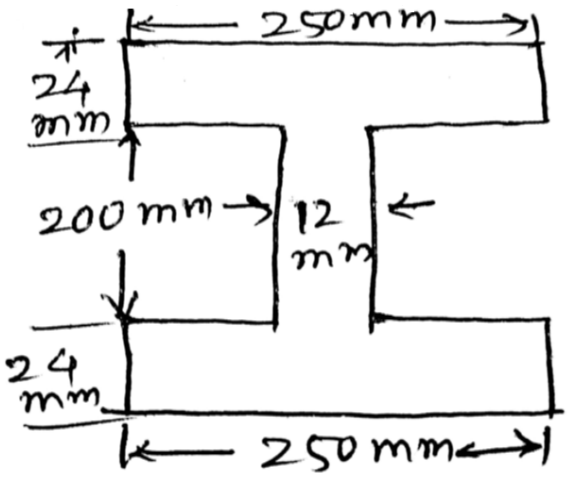
b) A steel rod 4 m long and 20mm in diameter is held firmly at its ends when the temperature of rod is 100°C. Determine the force exerted by the rod after it has been cooled to 60°C. 08

1) If the rod is not allowed to contract at all.
2) If the total contraction allowed is 1 mm.

Take $E = 200\ GPa$, $\alpha = 12 \times 10^{-6}/°C$

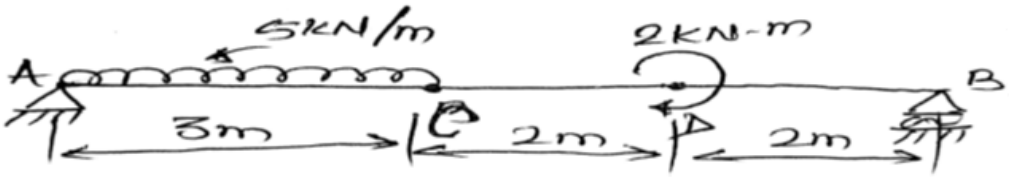
Q.4 a) Derive the expression for bending formula. 08

b) A rolled steel joist of I section has the dimensions shown in figure. If the beam is subjected a maximum bending moment of 180 kN-m. Calculate the maximum stress produced due to bending. The beam is simply supported at both ends. 07



Q.5 a) A thin cylinder of internal diameter 1.3 m contains a fluid at an pressure of 4 MPa. Find the maximum thickness of the cylinder if 06
1) Circumferential stress is not to exceed 50 MPa.
2) The longitudinal stress is not to exceed 30 MPa.

b) Calculate the deflection at point C and D for beam shown in figure using Macaulay's method. Take E=200 GPa.I $= 20 \times 10^7 mm^4$ 09



Section B

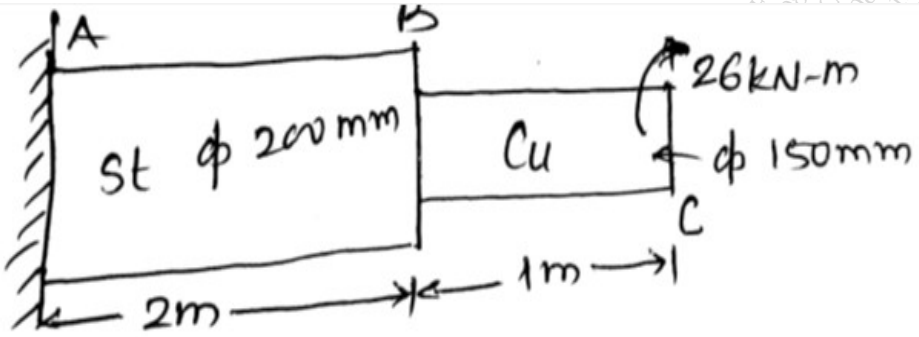
Q.6 Attempt any five of the following: 10

a) What are the assumptions made in the theory of pure torsion?
b) Define the terms: principal plane and principal stress.
c) Explain in short the condition of no tension for column.
d) Define the terms:- 1) Core or Kernel 2) Modulus of resilience.
e) What is polar modulus of solid shaft?
f) What do you mean by torsional stiffness and torsional rigidity?

Q.7 a) Derive the expression for torsional formula of solid shaft subjected to pure torsion. 08

b) A compound shaft is composed of a 1 m length of solid copper 150mm in diameter joined to a 2m length solid steel shaft 200 mm diameter. A torque of 26kN-m is applied at the end of the shaft and other end is fixed. Find the maximum shear stress in 07

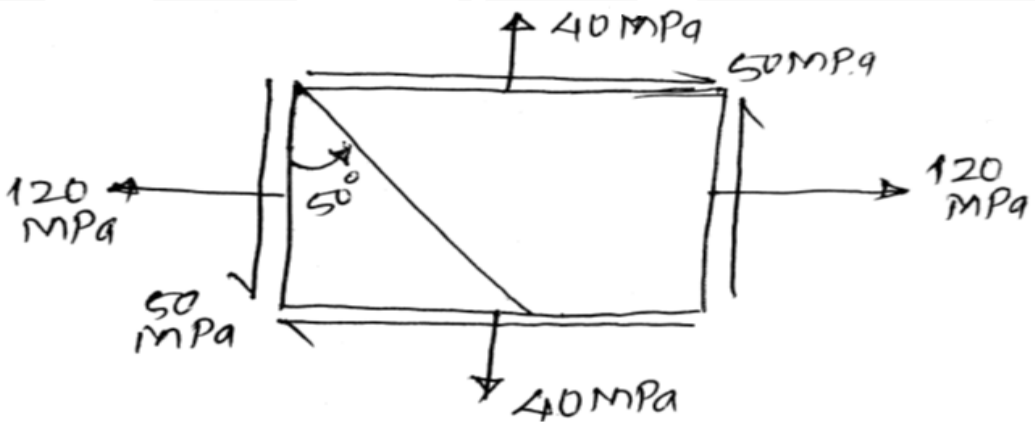
each material and the total angle of twist. Take $G_{copper} = 30\ GPa$
$G_{steel} = 85\ GPa$



Q.8 a) State and prove Castigliano's first theorem. 10

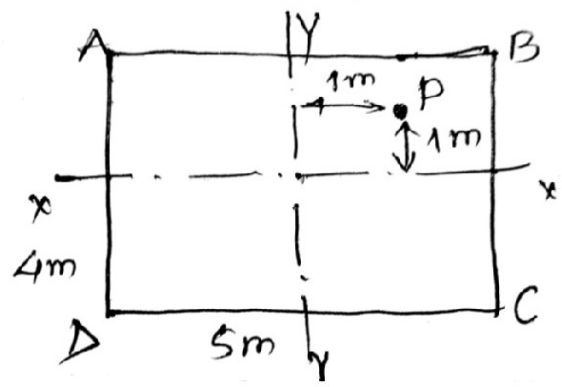
b) A bar 50 mm dia, 2m long is fixed at upper end and provided with a collar at the lower end. A weight of 600 N is dropped on the collar from the height of 300 mm. Take E=210 GPa. 05
Find :- 1) Instantaneous stress
2)Instantaneous elongation
3) Strain energy stored in the bar.

Q.9 A point in a strained material is subjected to stress shown in figure. Using Mohr's Circle, Determine:- 1) Normal and shear stress on inclined plane 15
2) Resultant stress on inclined plane
3) Angle of obliquity
4) Maximum principal stress
5) Maximum shear stress.
Check the answer analytically.



Q.10 a) Derive the expression for core or Kernel of solid rectangular section and also draw it. 05

b) A masonry pier $4m \times 5m$ supports a vertical load of 600 kN shown in figure. Neglect the self-weight. Find 1) the stresses developed at each corner. 10
2) What additional load is to be placed at the center of the pier so that there is no tension anywhere in the section.



Total No. of Printed Pages:6

SUBJECT CODE NO:- H-1275
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech.) (Sem-III)
Machine Drawing
[Old]

[Time: Four Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Q.No.1 from section A and Q.No.6 from section B is compulsory.
ii) Solve any two questions from the remaining in section A and, any one from the remaining in section B.
iii) Assume suitable additional data if required.
iv) Full marks include dimensioning and line work skills of drawing.

Section A

Q.1 a) Show the following types of sections used in orthographic projections with suitable sketch. 04
1. Full section, 2. Half section.

b) Draw a parabola using directrix focus method keeping distance between directrix and focus = 70 mm. 06

Q.2 a) Draw a locus of a point on the periphery of a circle which rolls on a curved path. Take a diameter of rolling circle 50 mm and radius of directing circle 75 mm. 07

b) An elastic string having a 200mm length has one end attached to the circumference of a circle of 50mm diameter. Draw the curve traced by the otherend of the string when it is tightly wound round the circle. 08

Q.3 A square prism 30 mm base sidesand 70mm axis is completely penetrated by another square prism of 25 mm sidesand 70 mm axis, horizontally. Both axes Intersect & bisect each other. Two faces of penetrating prism are 30^{o} inclined to H.P. draw projections showing curves of intersections. 15

Q.4 Figure 1 shows an isometric view of an object. Draw front view, top view and a sectional side view from right. 15

Q.5 Figure 2. shows top view and partial Auxiliary view. Redraw the top view, and the auxiliary view, add the front view. 15

Section B

Q.6 Draw neat sketch of showing conventional representation of (any one) 10
1. Spur gear and Bevel gear,
2. Ratchet and pinion
3. Screw thread nomenclature

Q.7 a) Draw the wilding symbols for the following, 30
i. Lap joint, Tee joint, Butt joint and corner joint

b) Draw the following,

i. Any one Locking arrangement of nuts,
ii. Lifting eye bolt,
iii. Double riveted lap joint

c) Draw the free hand sketches for the following (any two)
i. Flanged Nut, and Dome nut,
ii. Stud bolt and hexagonal headed bolt,
iii. Conventions for internal and external threads

Q.8 The part drawings of a Lathe tail stock are shown in figure 3, Assemble the parts and draw, 30

1. Half sectional front view, and
2. Side view

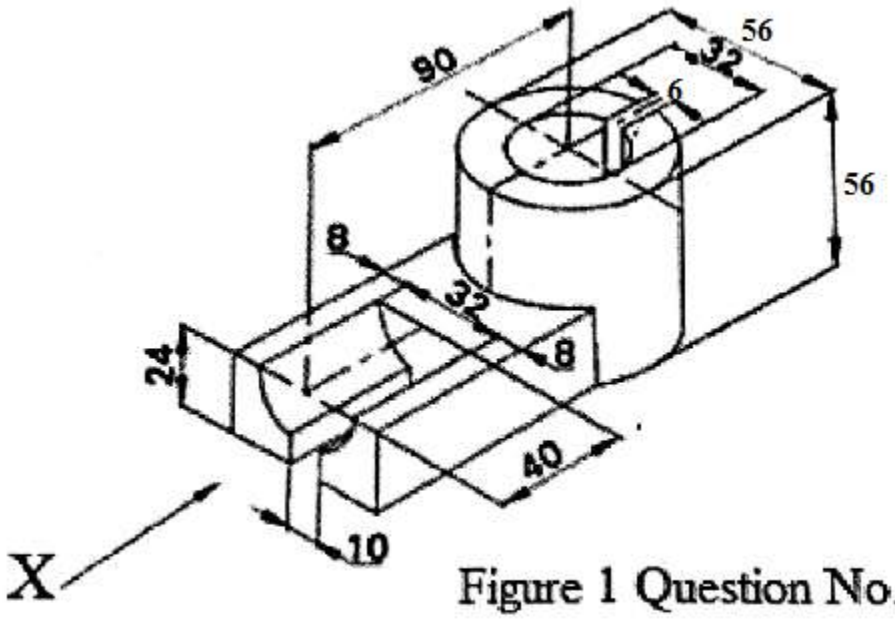


Figure 1 Question No. 4

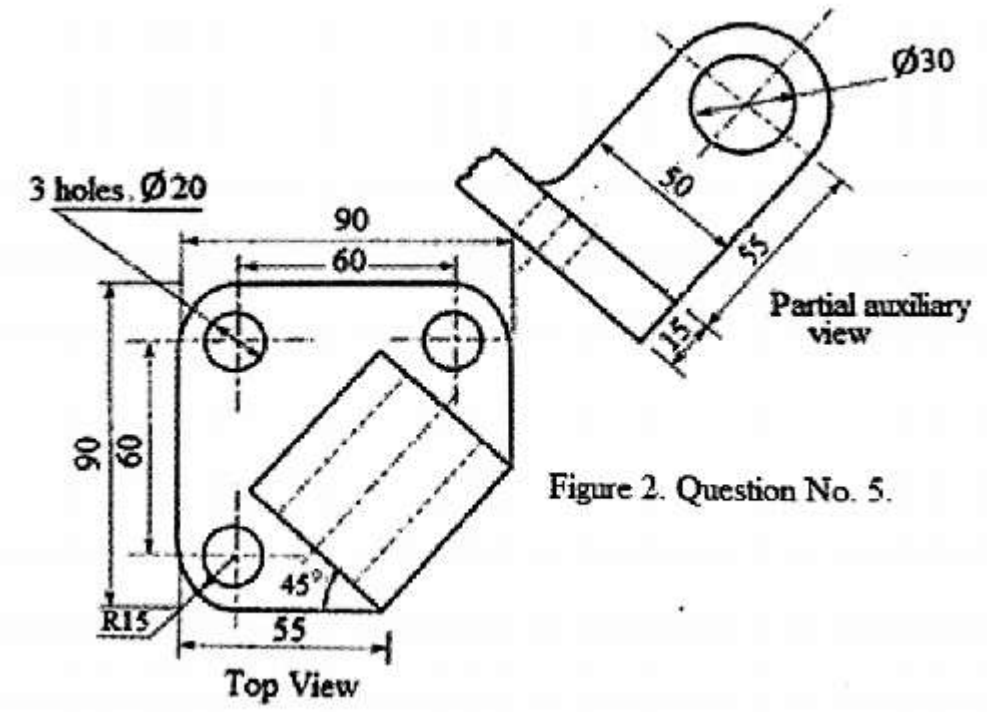
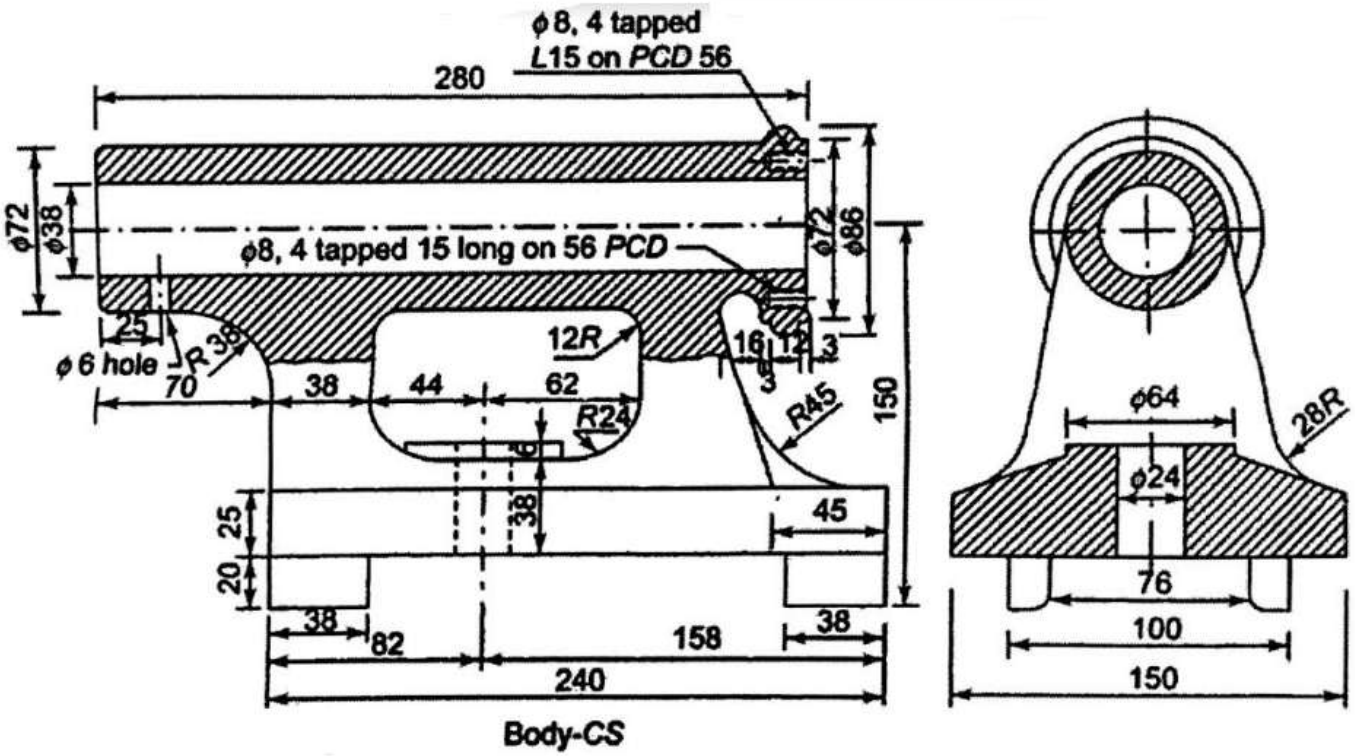


Figure 2. Question No. 5.



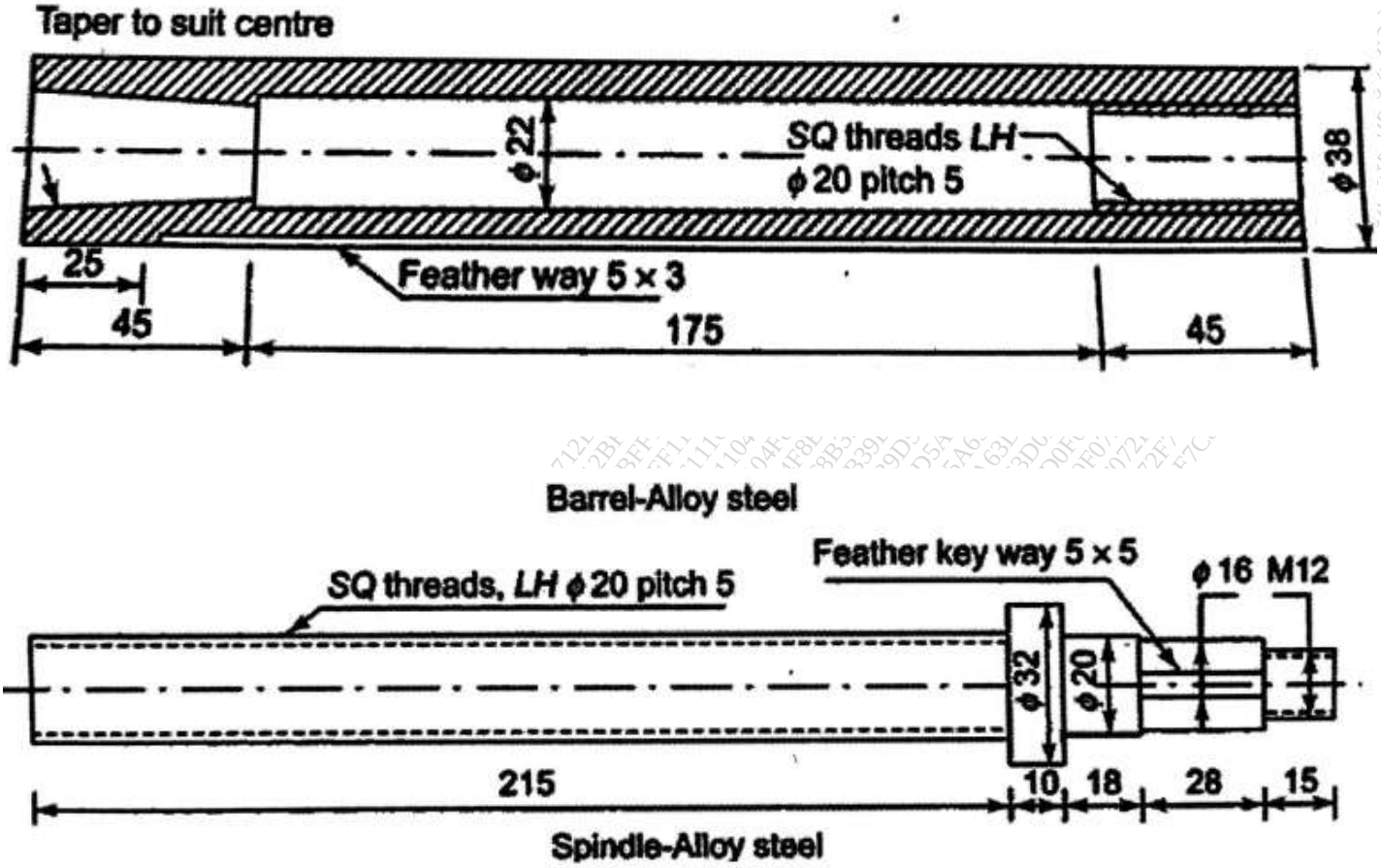
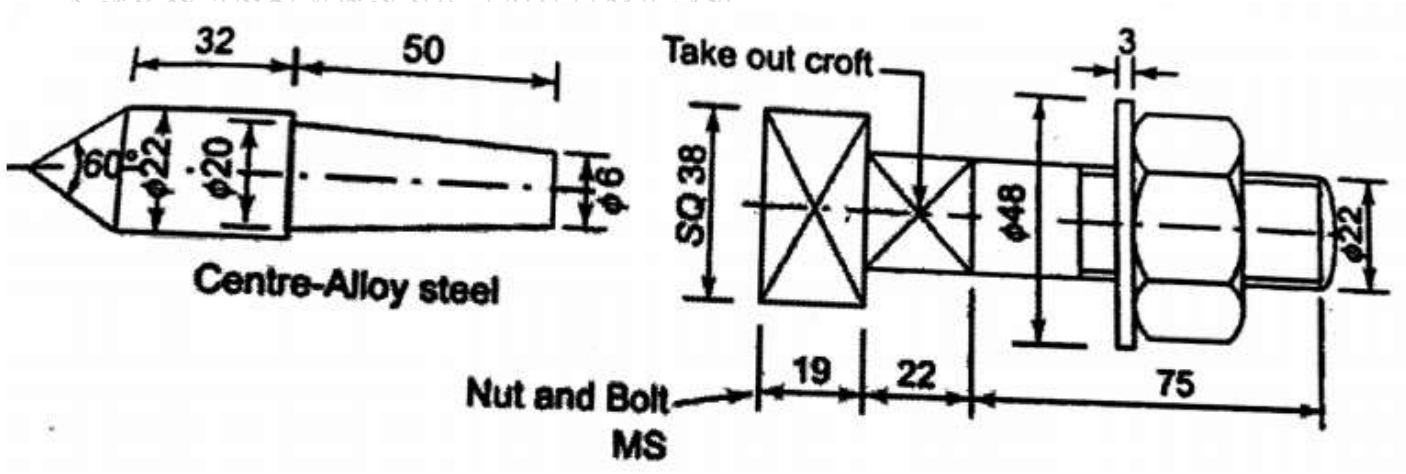
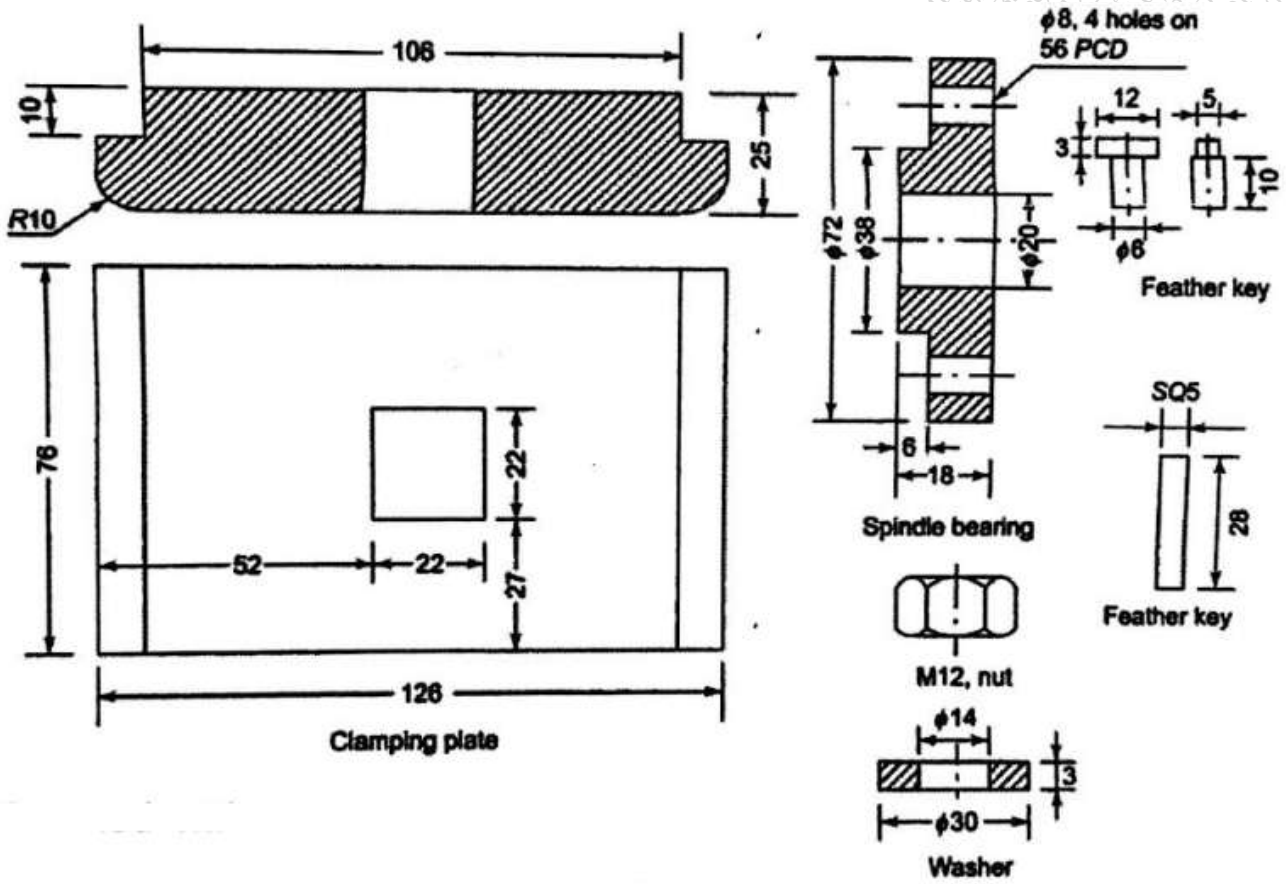
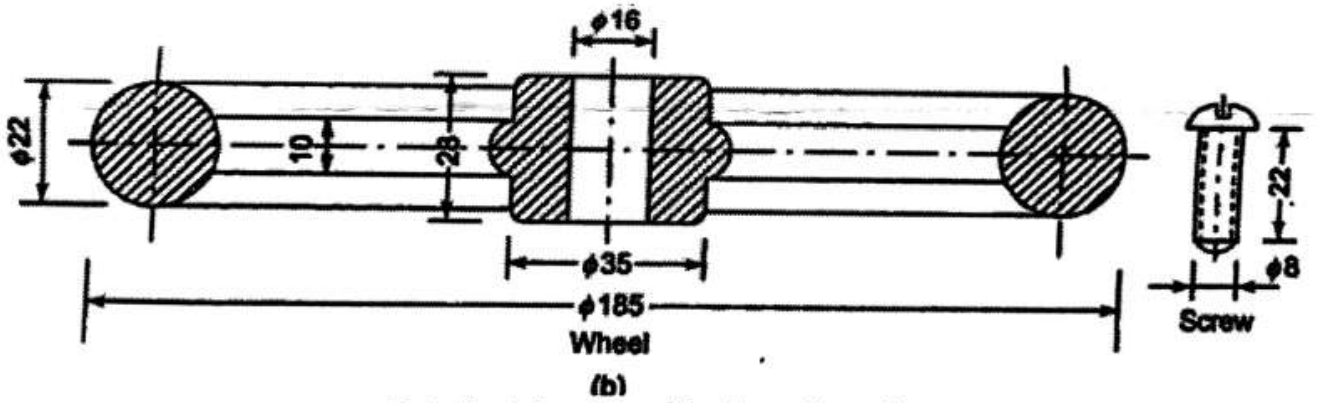


Figure 3. Question No. 8







(b)

Detailed drawing of Lathe tail stock

Figure 3. Question No. 8

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-1276
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech) (Sem-III)
Metrology & Quality Control
[Revised]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
i. Q. No. 1 & Q. No. 6 are compulsory. Attempt any two questions from remaining each section
ii. Assume suitable data whenever required
iii. Figure to the right hand margin indicate full marks

Section A

Q.1 Attempt any five of the following 10
i. What is principle of interference?
ii. Differentiate between accuracy & precision
iii. What do you mean by interchangeability?
iv. State the disadvantage of material standard
v. Define the term primary& secondary texture
vi. State any four characteristics of good comparator

Q.2 a) Explain the construction and working of Coordinate measuring machine 08
b) Discuss the various sources of errors. 07

Q.3 a) Explain the construction and working of dial gauge indicator. 08
b) Explain three wire method of thread measurement. 07

Q.4 a) Explain the construction and working of NPL interferometer 08
b) Describe construction & working of instrument used for measurement for surface finish 07

Q.5 a) Explain wringing of slip gauge 08
b) Explain Verniercaliper with neat sketch 07

Section B

Q.6 Attempt any five of the following 10
a) Differentiate between discrete data & continuous data
b) Enlist benefits of statistics in quality control
c) What is range in control chart?
d) Define control chart & state its objective
e) State the advantage of X bar & R chart
f) What is Average Outgoing Quality Limit (AOQL)

Q.7 a) Explain the importance and use of statistical quality control 08
b) Explain Chance causes and assignable causes. 07

Q.8	a)	Explain the use of control chart for variable and attribute.	08
	b)	Explain in detail hyper geometric distribution.	07
Q.9	a)	What is Acceptance sampling? Explain with example.	08
	b)	Discuss in detail various Sampling plan	07
Q.10	a)	Explain in detail process capability	08
	b)	Describe in detail producer risk &consumer risk	07

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1310
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech/Prod) (Sem-III)
Manufacturing Processes -I
[OLD]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 from section A and Q.No.6 from section B is compulsory.
ii) Attempt any three questions from each section.
iii) Figures to the right indicate full marks.

Section A

Q.1 Solve any Five questions from the following. 10

1) Which of the following is the Property enhancing processes?
   a. Heat treatment process
   b. Material removal process
   c. Deformation process
   d. Sulfidation process

2) A characteristic of a casting is its:
   a. Density
   b. Porosity
   c. Uniform grain structure
   d. Irregular grain structure

3) Permanent mold casting requires cores that are made of:
   a. Plaster
   b. Metal
   c. Sand
   d. All of the above

4) In rolling operation the roll rotates with surface velocity
   a. Exceeding the speed of incoming metal
   b. Lower than the speed of incoming metal
   c. Equal to speed of the incoming metal
   d. None of the above

5) The plastic deformation of metal takes place when the stress induced in the metal, due to the applied forces, reached the
   a. Yield point
   b. Proportional limit
   c. Fatigue strength
   d. Ultimate strength

6) Following are the advantages of hot working of metals, except

a. Close tolerances can be maintained
b. Porosity of the metal is minimized
c. Grain structure of the metal is refined
d. No residual stresses are introduced

Q.2 a) With the help of a neat diagram describe the process of true centrifugal casting. How can this method be used for production of pipes? 08
b) How do you classify the manufacturing processes? Explain in detail with example? 07

Q.3 a) Name and describe the different properties of good molding sand. 08
b) What is hot extrusion? In how many ways it can be performed? 07

Q.4 a) Explain with the help of neat sketches the construction and working of the Cupola furnace? 08
b) Explain the various cold drawing processes. 07

Q.5 a) What are different types of gates? Explain them with the help of sketches stating the relative merits and demerits of each. 08
b) What are the advantages of hot extrusion over rolling and forging? 07

Section B

Q.6 Solve any Five questions from the following. 10

1) Which of the following is an example of fusion welding?
a. Arc welding
b. Forge welding
c. Resistance welding
d. Thermit welding with pressure

2) Another name for SMAW is
a. Stick welding
b. TIG welding
c. MIG welding
d. Oxy Acetylene welding

3) Plastic bottles are manufactured using the process of
a. Blow moulding
b. Injection moulding
c. Atomizing
d. Die casting

4) The plastics which soften when heat is applied with or without pressure, but requires cooling to set them to shape are called as
a. Thermosofting materials
b. Thermosetting materials
c. Thermoplastic materials
d. Thermostatting materials

5) Plastic bars are manufactured using the process of
   a. Blow moulding
   b. Injection moulding
   c. Extrusion
   d. Die casting

6) Removing the pieces from the edge in shearing operation is known as?
   a. Perforating
   b. Parting
   c. Notching
   d. Lancing

Q.7	a)	Define electric arc welding. Discuss with the help of neat sketch, the principle of arc welding?	08
	b)	Give the advantages and limitations of plastic products. Plastic is substitute material of any ferrous or non ferrous material? Explain?	07
Q.8	a)	Identify the three basic types of sheet metal working operations and explain any two of them?	08
	b)	Explain TIG welding and MIG welding with its merits, demerits and application?	07
Q.9	a)	How does thermit welding process differ from ordinary arc welding? Explain?	08
	b)	Classify the press based on number of slides and explain any two of them?	07
Q.10	a)	What are Punching, Nibbling, Blanking, Piercing, and tools/machines are needed for these processes?	08
	b)	Write a short note on (any two) a. Injection Molding b. Welding torch and its parts c. Deep drawing	07

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1311
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech) (Sem-III)
Manufacturing Processes -I
[Revised]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Q. No.1 and 6 are compulsory.
ii) Solve any two questions from remaining from each section.
iii) Figures to the right indicate full marks.

Section A

Q.1 Attempt any five from the following 10

a) Give any one example of extruded product.
b) Why aluminium is the best material for pattern making?
c) On which factors surface finish of casting depends?
d) In which casting process permanent mould is used.
e) State any two metal forming process.
f) State the use of core in mould.

Q.2 a) Classify the manufacturing process. Distinguish between 'Primary' and 'Secondary' Process 07
b) Write a short note on Cupola furnace. 08

Q.3 a) What are the common allowances provided on patterns and why? 07
b) Briefly discuss the steps involved in making a casting. 08

Q.4 a) Discuss the methods used for the production of pipes and tubes. 07
b) Explain with neat sketch cluster rolling mill. 08

Q.5 Write a shortes on (any three) 15
(a) Spinning
(b) Defects in Extruded products
(c) Centrifugal casting
(d) Induction furnaces

Section B

Q.6 Attempt any five from the following 10
a) What is HAZ in welding?
b) Name any one product made by using blow moulding.
c) What are the Rivets?
d) State the different flames used in gas welding.

e) Explain in brief soldering method.
f) Which gases are used in gas welding.

Q.7 a) Explain the principle of arc welding. What is straight polarity and reverse polarity. 07
b) Explain the principle of spot welding. 08

Q.8 a) Explain step by step procedure of thermoforming with neat sketch. 07
b) Explain extrusion process and defects in extrusion. 08

Q.9 a) Describe powder metallurgy process with its advantages and limitation. 07
b) Classify the press on the basis of frame and construction and explain any one. 08

Q.10 Write short notes on (any three) 15
a) Blanking and punching
b) Compound dies
c) Compression molding
d) Oxyacetylene welding

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1358
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. Mech/Prod) (Sem-III)
Engineering Thermodynamics
[OLD]

[Time: Two Hours] **[Max.Marks:40]**

Please check whether you have got the right question paper.

N.B
1. Assume suitable data if necessary.
2. Question 1 and Question 5 are compulsory.
3. Solve any Two questions from remaining in each section.
4. Use of steam table is permitted.

Section A

Q.1 Solve **any Three** of the following questions 06
a) Define Boyle's law and Charles's law.
b) Write equation of state for real gas.
c) Define degree of superheat and dryness fraction.
d) Define phase and classify the phase?

Q.2 2.5kg of oxygen at pressure of 1 bar and 27°C is compressed isentropically to a pressure of 15 bar. The gas is then cooled at constant volume till it reaches its original pressure, calculate:- 07
a. Heat transferred b. Work done c. Change in entropy.

Q.3
a) A certain gas has C_p=2.968 and C_v=2.507 kJ/kg K. Find its molecular weight and the gas constant. 02
b) A constant volume chamber of 0.6 m^2 capacity contains 4kg of this gas at 10°C. Heat is transferred to the gas until temperature is 200°C. Find the work done, heat transferred and changes in internal energy, enthalpy and entropy. 05

Q.4 A vessel of 0.06 m^3 capacities contains a mixture of saturated steam and water at a temperature of 200°C, the mass of liquid water being 15 kg. Determine pressure, mass, enthalpy, specific volume, internal energy, and entropy. 07

Section B

Q.5 Solve **any Three** of the following questions 06
a) State Clausius second law of thermodynamics.
b) Enlist any four assumptions made in deriving SFEE.
c) Define Enthalpy and Heat Source.
d) State First law of thermodynamics applicable to flow and non-flow systems.

Q.6 A piston & cylinder machine contains a fluid system which passes through a complete cycle of four processes. During a cycle, the sum of all heat transfer is -680 kJ. The system completes 400 cycles per minute. Complete the following table showing the method for each item, and compute the net rate of work ouput in kW. 07

Process	Q (kJ/min.)	W(kJ/min.)	ΔE (kJ/min.)
1-2	0	8680	-
2-3	84000	0	-
3-4	-8400	-	-146400
4-1	-	-	-

Q.7 One inventor claims that 2 kg of air supplied to a magic tube at 4 bar and 20°C and two equal mass streams at 1 bar are produced, one at -20°C and other at 80°C. Another inventor claims that it is also possible to produce equal mass streams, one at -40°C and other at 40°C. Whose claim is correct and why? Consider that it is an adiabatic system. (Take C_p air 1.012 kJ/kg K). 07

Q.8 2 kg/s of air at 15°C is raised to 800°C by passing it through a heat exchanger. At the exit of the heat exchanger air possesses a velocity of 30 m/s. Then the air enters nozzle where it expands to the temperature of 700°C. On leaving the nozzle air enters the turbine and get expanded up to 450°C and possesses a velocity of 60 m/s. Calculate a) the heat transfer in the heat exchanger) work interaction in the turbine and exit velocity of air in the nozzle. Assume C_p of air =1.005kg/s and h=Cp x (t). 07

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1359
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y.B.Tech. (Mech.) (Sem-III)
Engineering Thermodynamics
[Revised]

[Time: Two Hours] **[Max.Marks: 40]**

Please check whether you have got the right question paper.

N.B
1. Assume suitable data if necessary.
2. Question **1** and Question **5** are compulsory.
3. Solve any **Two** questions from remaining in each section.
4. Use of steam table is permitted.

Section A

Q.1 Solve any Three of the following questions 06
a) State Clausius second law of thermodynamics.
b) Enlist any four engineering applications of SFEE.
c) Define sensible heat of water and enthalpy of wet steam.
d) State First law of thermodynamics applicable to flow and non-flow systems.

Q.2 Air at 1.02 bar, 22°C, initially occupying a cylinder volume of 0.015 m^3, is compressed reversibly and adiabatically by a piston to a pressure of 6.8 bar. Calculate: (i) The final temperature; (ii) The final volume; (iii) The work done. 07

Q.3 One invertor claims that 2 kg of air supplied to a magic tube at 4 bar and 20°C and two equal mass streams at 1 bar are produced, one at -20°C and other at 80°C. Another inventor claims that it is also possible to produce equal mass streams, one at -40°C and other at 40°C. Whose claim is correct and why? Consider that it is an adiabatic system. (Take Cp air 1.012kJ/kg K). 07

Q.4 The working fluid, in a steady flow process flows at a rate of 220 kg/min. The fluid rejects 100 kJ/s passing through the system. The conditions of the fluid at inlet and outlet are given as: C_1 = 320 m/s, p_1=6.0bar, u_1=2000 kJ/kg, v_1=0.36 m^3/kg and C_2=140 m/s, p_2 =1.2 bar, u_2= 1400 kJ/kg,v_2=1.3m^3/kg. The suffix 1 indicates the condition at inlet and 2 indicates at outlet of the system. Determine the power capacity of the system in MW. The change in potential energy may be neglected. Represent the system diagrammatically. 07

Section B

Q.5 Solve any Three of the following questions 06
a) Define Boyle's law and Charles's law.
b) Write equation of state for real gas and perfect gas.
c) Define degree of superheat and dryness fraction.
d) Define phase and write suitable example.

Q.6 2.5 kg of oxygen at pressure of 1 bar and 27°C is compressed isentropically to a pressure of 15 bar. 07

The gas is then cooled at constant volume till it reaches its original pressure, calculate:-
a. Heat transferred b. Work done c. Change in entropy.

Q.7 Explain the terms 'Entropy of evaporation' and 'Entropy of wet steam'. 07

Q.8 A vessel of 0.06 m^3 capacities contains a mixture of saturated steam and water at a temperature of 200°C, the mass of liquid water being 15 kg. Determine pressure, mass, enthalpy, specific volume, internal energy, and entropy. 07

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-133
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Thermodynamics -II
[Revised]

[Time: Three Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B.:
i. Assume suitable data, if necessary.
ii. Question No.1 and Question No. 6 are compulsory from section A and B.
iii. Solve any TWO questions from remaining in each section A and B
iv. Use Steam Table, Mollier Diagram is Permitted.

Section A

Q.1 a) Define the terms 06
a. Evaporation rate
b. Equivalent of evaporation
c. Boiler thermal efficiency

b) With suitable neat sketch explain construction and working principle of Benson Boiler? 07

Q.2 A boiler uses 20 kg air per kg of fuel. The fuel consumption is 33 kg/s and actual draught required is 18 mm of water taking into account all the losses. Determine the chimney height and its diameter if the actual velocity of flue gases is 0.38 times the theoretical velocity due to friction. The surrounding temperature is at 25^0C and flue temperature is 230^0C. 13

Q.3 a) Derive an equation for condition for maximum discharge through the chimney? 06
b) Prove that maximum discharge in a steam nozzle per unit area at the throat is given by, 07

$$m_{max} = \left[1000\, n\, x\, \frac{P_1}{v_1}\left(\frac{2}{n+1}\right)^{\frac{n+1}{n-1}}\right]^{\frac{1}{2}}$$

Where,
P_1 = Initial pressure,
v_1 = volume of steam in m3/kg at the initial pressure,
n=Index of expansion

Q.4 Design a nozzle for the following data: 13
Initial steam pressure = 13 bar
Final steam pressure = 4 bar
Quantity of steam = 1.2 kg/s
Steam temperature at inlet = 300^0C
Nozzle efficient = 0.86

Q.5 Write short notes on (Any TWO) 14

a. Explain Boiler Trial or Heat Balance Sheet of the Boiler.
b. What are the advantages of forced draught system over induced draught system?
c. Supersaturated flow through nozzle.

Section B

Q.6 a) Describe the factors affecting the efficiency of condensing plant. 06

b) Compare jet condenser and surface condenser? 07

Q.7 A steam turbine supplied with steam at a pressure of 85 bar and 450^0C. The steam is reached to its original temperature in a reheater at 10 bar. The expansion then takes place at condenser pressure of 0.08 bar. Find the efficiency of the reheat cycle and the work output if the flow of steam is 1kg/s. Consider the pump work and assume that the expansion in the turbine is isentropic. 13

Q.8 a) With suitable neat sketch explain regenerative cycle? 06

b) Compare axial flow compressor versus centrifugal compressor? 07

Q.9 A single stage reciprocating air compressor is required to compress 1 kg of air from 100 kPa to 400 kPa. The initial temperature is 27^0C, compare the work requirement in the following cases: Isothermal compression, compression with $PV^{1.2} = C$, Isentropic compression. 13

Q.10 Write short notes on (Any TWO) 14

a. What are the sources of air leakage in a steam condenser? Explain the effects of air leakage in condenser?
b. Why Carnot cycle is not practicable for steam power plant?
c. Explain perfect and imperfect intercooling?

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-134
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Theory of Machines-I
[OLD]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1. Q.1 and Q.6 are Compulsory.
2. Attempt any two questions remaining from each section.
3. Assume suitable data if required.

Section A

Q.1 Attempt any five: (10)

1. Compare rigid and resistant body.
2. State two examples of higher and lower pair each.
3. What is successfully constrained motion?
4. Show that for five bar mechanism the degree of freedom is zero.

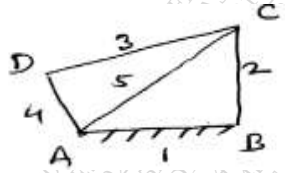


Figure 1

5. Draw neat sketch of Elliptical trammel and scotch yoke mechanism.
6. Show space and body centrode with figure.
7. What is magnitude of coriolis component of acceleration?
8. What is acceleration image?
9. Compare relative velocity and instantaneous center method of velocity analysis.
10. Enlist inversion of single and double slider crank chain.

Q.2 Figure 2 represents a mechanism that is used in the head of sewing machine to operate the needle bar. The dimensions of various links are as follows crank OA rotates uniformly in clockwise direction at 50 rpm. For the given condition find out the velocity of the slider and angular velocity of various links. (15)

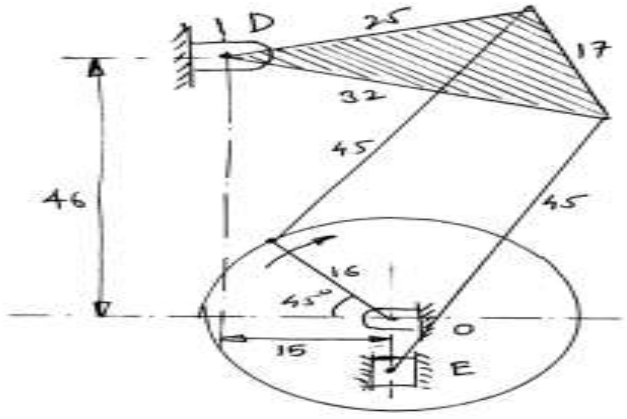


Figure 2

Q.3 Figure 3 shows a mechanism having six links. Input link O_2A (in the horizontal position) rotates at 10 rad/s anti-clockwise direction. Determine the velocity of slider D (link 6) using relative velocity method given (15)
O_2A=25 cm, AC=65 cm, AB=60 cm, BC=10 cm, O_4B=30 cm, CD=75 cm. also determine acceleration of slider D.

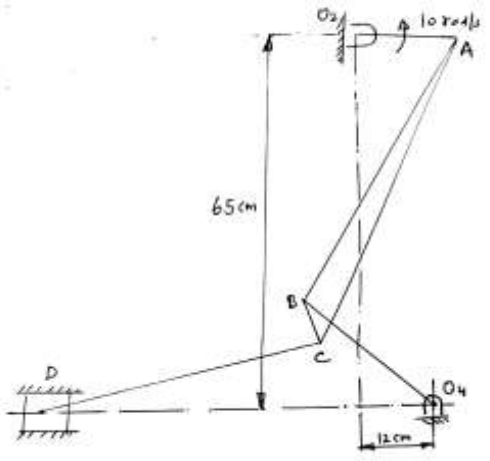


Figure 3

Q.4 a) Derive an expression for velocity and acceleration of piston with usual notation. (08)
b) Determine the velocity and acceleration of piston when the crank is at 40° from inner dead centre position for crank and connection rod of a steam engine are 0.3 m and 1.5 m in length. The crank rotates at 180 rpm clockwise. (07)

Q.5 A vertical engine running at 1200 rpm with a stroke of 110 mm, has a connecting rod 250 mm between centres and mass 1.25 kg. The mass centre of the connecting rod is 75 mm from big end and centre and when suspended as a pendulum from the gudgeon pin axis makes 21 complete oscillations in 20 seconds. Calculate the radius of gyration of the connecting rod about an axis though its mass centre. When the crank is at 40° from the TDC and piston is moving downwards find analytically, the acceleration of the piston and the angular acceleration of connecting rod. Hence find the inertia torque exerted on the crankshaft. Necessary correction torque has to be applied and gravity effects are considered. (15)

Section-B

Q.6 Attempt any five: (10)

1. Draw velocity and acceleration diagram when follower moving with SHM.
2. Classify Cam profile based on surface in contact.
3. State equation for maximum acceleration of follower during outstroke and during return stroke with uniform acceleration & retardation.
4. Draw neat sketch of cylindrical cam.

5. What are functions of brakes?
6. Compare band and block brake.
7. Why reciprocating engine are partially balanced?
8. What is purpose of balancing the reciprocating masses?
9. Compare multicylinder inline and radial cam.
10. What is direct & reverse crank in case of balancing?

Q.7 Draw the profile of a cam to raise a valve with SHM through 40mm in 1/4th of revolution, keep it fully raised through 1/10th revolution and to lower it with uniform acceleration and retardation in 1/6th revolution. The valve remains closed during the rest of the revolution. The diameter of roller is 20mm and minimum radius of cam to be 30mm. The axis of the valve rod passes through the axis of cam shaft. The cam shaft rotates at 360 rpm clockwise. Determine maximum velocity and acceleration of the follower during outstroke and return stroke. (15)

Q.8 A differential band brake is shown in figure 4. The width and the thickness of the steel band are 120mm and 4mm respectively and the permissible tensile stress in the band is limited to 60 N/mm^2. The Coefficient of friction between the friction lining and the brake drum is 0.25. Find the maximum braking torque that can be applied and the corresponding actuating force P. Is the brake self locking? What actuating force is needed if the direction of rotation is reversed? (15)

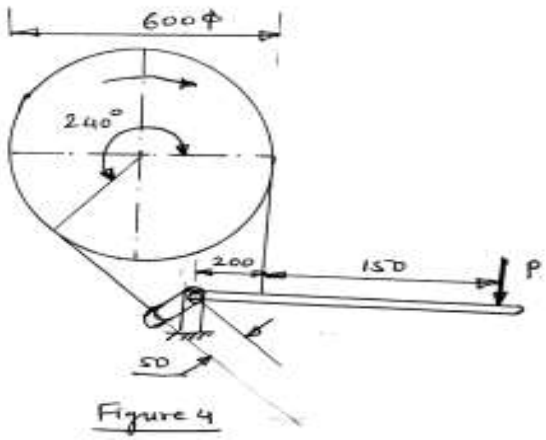


Figure 4

Q.9 A shaft is supported between bearing 2m apart and extended 0.5 m beyond bearings at each end. The shaft carries three pulleys, one at each end and one at the middle of length. The masses of each pulleys are 50 Kg and 25 Kg and their centre of gravities. One 20mm and 15 mm respectively from the shaft axis. The centre pulley has mass of 60 Kg and its centre of gravity is 20mm from the shaft axis. If the pulleys are arranged so as to give the static balance, determine: (15)

i) the relative angular position of the pulleys and
ii) the dynamic forces produced on the bearings when the shaft rotates at 400 rpm.

Q.10. A four cylinder inline engine has two outer cranks placed at 120° apart and their individual reciprocating masses are 200Kg. The distance between cranks are 200mm, 600mm and 500 mm respectively. The crank radius is 300mm and the length of connecting rod is 1200 mm. The crank rotates at 340 rpm. If the engine is to be in complete primary balance. Find the reciprocating masses and the relative angular positions for each of the inner cranks. Also find the magnitude of secondary unbalance force. (15)

Total No. of Printed Pages:4

SUBJECT CODE NO:- H-168
FACULTY OF SCINECE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Theory of Machines –I
[Revised]

[Time: Four Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

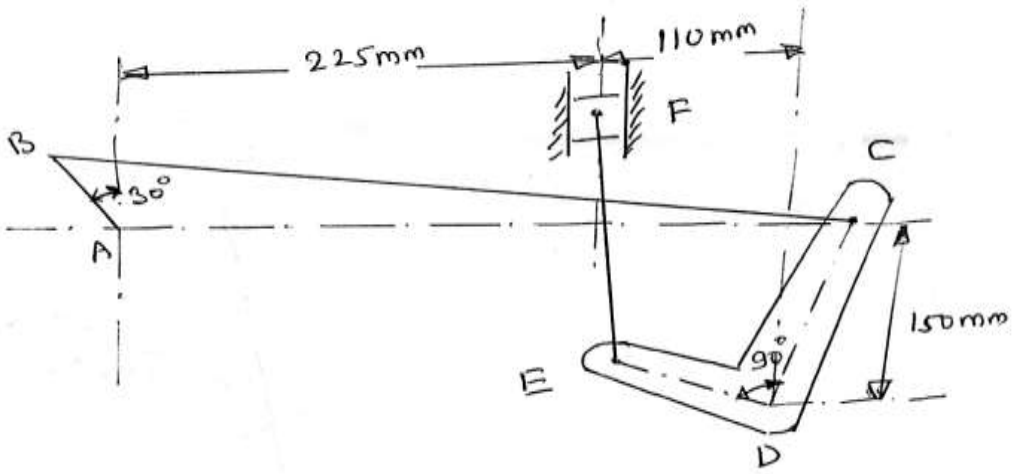
N.B
1. Q.no.1 and Q.no.6 are compulsory.
2. Attempt any two questions out of remaining from each section.
3. Figures to the right indicate full marks
4. Draw neat sketches wherever necessary
5. Assume suitable data wherever necessary

Section -A

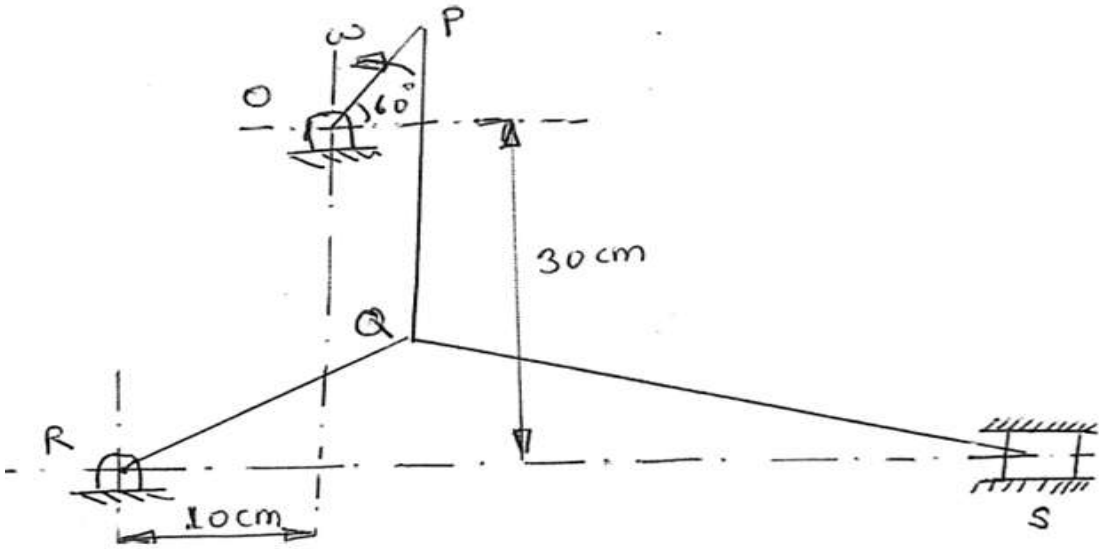
Q.1 Attempt any five 10

A) Define kinematics and dynamics
B) What is degree of freedom of mechanism
C) Classify kinematic pair in detail
D) What is inversion of mechanism
E) State inversions of double slider crank chain with example.
F) Draw neat sketch of any two inversion of single slider crank chain.
G) What is importance of velocity and acceleration analysis
H) Define radial component of acceleration
I) When to consider the coriolis component of acceleration in analysis
J) State properties & instantaneous center of rotation.

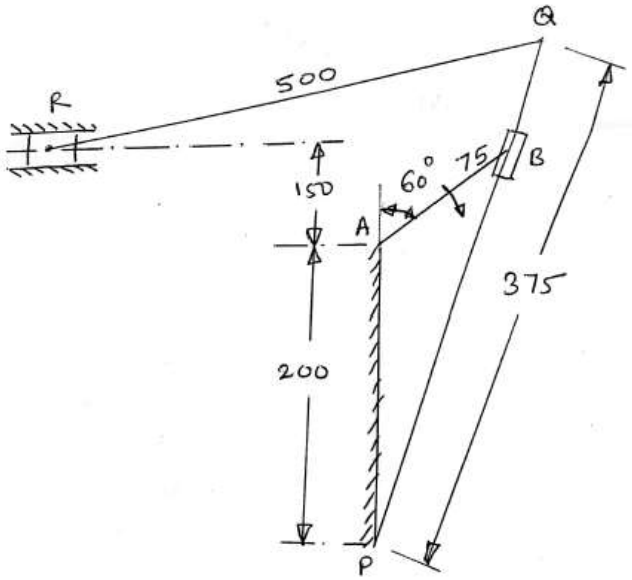
Q.2 The dimensions of various links in a mechanism as shown in figure 1, are as follows 15
AB=60mm, BC= 400mm, CD= 150mm DE= 115mm and EF=225mm
Find the velocity of the slider F when the crank AB rotates uniformly in clockwise direction at a speed of 60 rpm.



Q.3 The mechanism in which the length of various links are as follows OP= 15cm , PQ=30cm, QR=22.5cm and QS=50cm. 'S' is a slider which is constrained to move in a horizontal direction for the given configuration, find the velocity of slider S and angular velocity of links QR and QS when the crank OP is rotating uniformly with a speed of 200 rpm in counter clockwise direction by instantaneous centre method (refer figure 2) 15



Q.4 The driving crank AB of the quick – return mechanism as shown in figure 3 revolves at a uniform speed of 200 rpm. Find the velocity and acceleration of the tool- box R, in the position as shown when the crank makes an angle of 60º with the vertical line of center PA what is the acceleration of sliding of the block at B along the slotted lever PQ 15



Q.5 a) Derive an expression for acceleration of engine mechanism. 08

b) Explain with neat sketch crank and slotted lever mechanism. 07

Section – B

Q.6 Attempt any five 10

a) State material for brake lining
b) Compare band and block brake
c) What is self energizing brakes
d) Define pressure angle of cam
e) Define static balancing
f) State condition of Dynamic balancing
g) State procedure of balancing of masses rotating in different plane
h) Define swaying couple
i) Compare primary and secondary unbalance force
j) What is variation of tractive force

Q.7 A cam operate a flat faced follower which moves with cycloidal motion during ascent and descent The minimum radius of cam = 30mm 15

Lift of follower = 40mm

Angle of ascent = 120º

Angle of dwell = 60º

Angle of descent = 90 º

Speed of cam = 320 rpm

Draw the cam profile and find the maximum velocity and acceleration of the follower during ascent and descent

Q.8 A band and block brake, having 12 blocks each of which subtends an angle of 13º at the centre is applied to the drum of 1m effective diameter. The drum and flywheel mounted on the same shaft has a mass of 2000kg and a combined radius of gyration of 500 mm. The two ends of the band are attached to pins on opposite side of the brake lever at a distance of 30mm and 120mm from the fulcrum. If a force of 200 N is applied at a distance of 750 mm from the fulcrum. Find 15

i) Maximum braking torque
ii) Angular retardation of the drum
iii) Time taken by the system to come to rest from the rated speed of 360 rpm. $\mu = 0.3$

Q.9 a) Four masses P,Q,R and S revolves at equal radii and are equally spaced along a shaft. The mass Q is 7 kg and the radii of R and S make angles of 90 º and 240 º respectively with the radius Q find the magnitude of the masses P,R and S and the angular position of P so that the system may be completely balanced. 15

Q.10 A four crank engine has the two outer cranks set at 120 º to each other and their reciprocating masses are each 400 kg. The distance between the planes of rotation of adjacent cranks are 450mm , 750mm and 700mm.If the engine is to be in complete primary balance, find the reciprocating mass and the relative angular position for each of the inner cranks. 15
If the length of each crank is 300mm, the length of each connecting rod is 1.2m and the speed of rotation is 240 rpm what is maximum secondary unbalanced force ?

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-169
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Thermodynamics-II
[OLD]

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B i) Assume suitable data, if necessary.
ii) Question No.1 and Question No. 6 are compulsory from section A and B.
iii) Solve any TWO questions from remaining in each section A and B.
iv) Use Steam Table, Mollier Diagram is Permitted.

Section – A

Q.1 Attempt any FIVE of the following? 10

a. Define Evaporative capacity of the boiler?
b. Classify the types of boilers?
c. Define natural draught and classify boiler draught?
d. Difference between natural draught and artificial draught?
e. Write the engineering applications of nozzle?
f. Define nozzle efficiency?

Q.2 a) With suitable neat sketch explain construction and working principle of Benson boiler? 07

b) Following reading were recorded during a boiler trial of 6 hours duration: 08
Mean steam pressure =12 bar
Mass of steam generated=40000 kg
Mean dryness fraction = 0.85
Mean feed water temperature = 30°C
Coal used =4000 kg. C.V. of coal = 33400 kJ/kg.
Calculate: Factor of equivalent of evaporation, Heat rate of boiler kJ/kg.
Equivalent of evaporation from and at 100°C, and efficiency of boiler

Q.3 a) Prove that the draught produced in mm of water by a chimney, is given by: 07

$$h = 353H\left(\frac{1}{T_1} - \frac{m+1}{mT_2}\right) mm\ of\ water$$

b) Determine the air –fuel ratio for an oil fired steam with the following data: 08
Chimney height= 40 m
Draught=25 mm of water column
Mean chimney gas temperature =367°C
Ambient outside temperature=20°C
Also calculate the velocity of the flue gases

Q.4 a) Prove that maximum discharge in a steam nozzle per unit area at the throat is given by, 07

$$m_{max} = \left[1000n\ x\frac{P_1}{v_1}\left(\frac{2}{n+1}\right)^{\frac{n+1}{n-1}}\right]^{\frac{1}{2}}$$

Where,
P_1=Initial pressure,
v_1=Volume of steam in m^3/Kg at the initial pressure,
n=Index of expansion.

b) A dry saturated steam with an initial pressure of 11 bar is expanded in a group of convergent divergent nozzles at the rate of 5 kg/s. the back pressure is 1.5 bar. The nozzle efficiency is 90% and approximate throat section of each nozzle is estimated to 1 cm^2. Design the suitable number of nozzles and exact throat and areas. Take index of expansion as 1.119. 08

Q.5 Write short notes on (Any THREE) 15

a. Boiler trial and heat balance sheet?
b. What are the advantages of forced draught system over induced draught system?
c. What do you understand by balanced draught? Explain with suitable neat sketch?
d. Describe the factors affecting the efficiency of condensing plant.

Section – B

Q.6 Attempt any FIVE of the following? 10

a. Define vacuum efficiency of the condenser?
b. Write the advantages of jet condensers?
c. Draw P-V and T-S diagram for reheat cycle?
d. Define steam ratio?
e. Classify reciprocating air compressor?
f. Write down the practical application of compressed air?

Q.7 a. State the Dalton's of partial pressure? How it can be applied to condenser applications? 07

b. A surface condenser deals with 2100 kg of steam per hour and the air leakage amounts to 0.8 kg per hour. The temperature of air pump suction is 35°C and vacuum is 680 mm of Hg when the barometer reads 760 mm of Hg. Determine the capacity of wet air pump which has a volumetric efficiency of 75%. 08

Q.8 a. With suitable neat sketch explain regenerative cycle? 07

b. A steam turbine supplied with steam at a pressure of 85 bar and 450°C. The steam is reached to its original temperature in a reheater at 10 bar. The expansion then takes place at condenser pressure of 0.08 bar. Find the efficiency of the reheat cycle and the work output if the flow of steam is 1 kg/s. Consider the pump work and assume that the expansion in the turbine is isentropic. 08

Q.9 a. Find the equation for work per kg of single stage single acting reciprocating air compressor when the air is compressed with and without clearance. 07

b. A single stage single acting reciprocating compressor delivers 150 m^3 of free air per minute, compressing it from 1 bar to 8 bar. The speed of the compressor is 300 rpm. If the clearance is $1/16^{th}$ of swept volume, find the diameter and stroke of the compressor. Take L/D= 1.5 where L is the stroke and D is the bore. The value of n can be taken as 1.3. 08

Q.10 Write short note on (Any THREE) 15

a. What are the sources of air leakage in a steam condenser? Explain the effects of air leakage in air condenser?
b. Explain the factors affecting the efficiency of Rankine cycle?
c. Why Carnot cycle is not practicable for steam power plant?
d. Explain perfect and imperfect intercooling?

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-203
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Electrical Machines
[Revised]

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
- Question no 1 from section A and Question no 6 from section B are compulsory.
- Solve any two from remaining questions from each section
- Assume suitable data, if required.

Section – A

Q.1 Attempt following (Any Five) 10
a) Explain the Magnetic losses occurred in D.C machine.
b) Explain the Significance of Back emf.
c) Enlist the types of D.C Machines.
d) Draw circuit diagram of Swinburne's Test.
e) Why DC series motor can not start without load?
f) A 4-pole wave wound armature has 8 conductors and is rotated at 1000 rpm. If the useful flux is 20 mWb, Calculate the generated Voltage.
g) Write down the advantages of Stepper motor.
h) Write down the principle of D.C Generator and D.C Motor?

Q.2 a) Explain construction and main parts of DC machine with neat labelled diagram. 07
b) Explain the types of DC machines with neat circuit diagram. 08

Q.3 a) Explain solid state starters speed control of DC motor. 07
b) Explain the characteristics of D.C Series motor. 08

Q.4 a) Explain 4 point starter of DC motor with neat labelled diagram. 07
b) Explain Swinburne's Test in detail. 08

Q.5 Write a short notes. (any three) 15
a) Torque equation of D.C machine.
b) Swinburne test
c) PMDC motor
d) BLDC motor

Section – B

Q.6 Attempt following (Any Five) 10
a) Enlist the types of methods of starting of Synchronous motor.
b) A 4 pole synchronous generator at 50 Hz then find its synchronous speed.
c) Write down the application of DC Servo motor.
d) Write down the working principle of Synchronous motor.
e) Write down the function of damper winding in Synchronous motor.
f) Write down the Dis-advantages of BLDC motor.
g) Write application of capacitor start capacitor run single phase induction.
h) Write down the application of Hysteresis motor.

Q.7	a)	Explain construction and working principle of three phase Induction motor.	07
	b)	Write a short note on Losses in 3 phase Induction Motor.	08
Q.8	a)	Explain construction and working principle of Synchronous machine.	07
	b)	Drive the EMF equation of Synchronous machine.	08
Q.9	a)	Explain the Double revolving field theory Single Phase Induction Motor.	07
	b)	Explain no load and block rotor test of Single phase Induction motor.	08
Q.10	Write a short notes. (Any three)		15
	a)	Hunting in Synchronous motor.	
	b)	Shaded pole single phase induction motor.	
	c)	Repulsion motor.	
	d)	AC Servomotor.	

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-204
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Electrical Machine & Applied Electronics
[OLD]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Question no 1 from section A Question no 6 from section B are compulsory.
2) Solve any two questions from remaining in each section.
3) Assume suitable data, if required.

Section A

Q.1 Attempt any five of the following 10
a) What are the different types of DC motors?
b) Give the selection criteria of electric drive.
c) What is necessity of starter in DC Motors?
d) Enlist the breaking methods for DC motors.
e) Why the rotor conductor bars are skewed in squirrel cage rotor?
f) What is regenerative braking?
g) What is slip?
h) Explain brushless DC motor.

Q.2 a) Give the comparison between electric breaking and mechanical breaking. 07
b) What are types of drives? Explain group drive with suitable example. 08

Q.3 a) Derive the expression for the cooling of the machines. 08
b) Explain the construction of DC Motor with neat diagram 07

Q.4 a) Draw and Explain Torque-Slip characteristics of three phase induction motor. 08
b) What are different starters for three phase induction motor? Explain DOL Starter. 07

Q.5 Write a short notes (any three) 15
a) DC servomotors
b) Speed Control of DC Motor
c) Shaded Pole Induction Motor
d) Application of electric drive for Cement Industry

Section- B

Q.6 Solve any FIVE from following 10
a) What is SCR
b) What are types of sensors
c) Explain Piezo – electric effect
d) What is need of buzzer and alarms?
e) Enlist types of Temperature sensors

f) Draw Opto-coupler
g) What do you mean by relay?
h) What is LVDT?

Q.7 a) Explain thermocouple in detail. 07
b) What are the types of load cells? Explain the construction and working of any one. 08

Q.8 a) With the help of neat diagram, explain the construction and working of Relays. 07
b) What are different types of displays? Explain working of LCD displays 08

Q.9 a) Explain the construction of MOSFET. 08
b) Draw & explain solenoid valve 07

Q.10 Write short notes on (any three) 15
i) Air flow sensor
ii) Proximity Switch
iii) Sequential timer circuit
iv) Dimmer circuit.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-275
FACULTY OF SCINECE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Machine Tools
[Revised]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Solve any three Questions from each section.
2. Figures to the right indicate full marks.
3. Add suitable sketches, wherever necessary.

Section – A

Q.1	A)	Define and explain tool life. What is the effect of speed, feed and depth of cut on tool life?	07
	B)	Name and explain the parameters giving rise to continuous chips. What are its disadvantages and how can they be avoided?	06
Q.2	A)	Draw and explain different work holding devices used on lathe.	07
	B)	Explain the main parts of lathe machine with a labeled diagram.	06
Q.3	A)	Explain different operations performed on milling machine	07
	B)	Explain the working of universal dividing head with figure.	06
Q.4	A)	Explain the construction of slotter with a neat diagram.	06
	B)	Explain what is hobbing and the procedure of gear hobbing.	07
Q.5	Write short note on the following :		14
	A)	Tool holding devices on milling machine.	
	B)	CIM applications.	

Section – B

Q.6	A)	Explain different operations performed on drilling machine.	07
	B)	Explain the function of boring bar with an example.	06
Q.7	A)	Explain electro – chemical machining process (ECM) in detail.	07
	B)	What is principle of Abrasive jet machining (AJM)? Explain construction and working of AJM equipment.	06
Q.8	A)	State and explain the selection of lubricant according to condition of machine tools.	07
	B)	Explain breakdown maintenance, its advantages and limitations.	06

Q.9 A) Explain the construction and working of a quick change chuck used on drilling machine with sketch. 07

B) Explain electron beam machining (EBM) in detail. 06

Q.10 Write short note on the following: 14

A) Grit, grade and structure of grinding wheel.

B) Applications, advantages and limitations of broaching.

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-276
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-II)
Production Processes-II
[Old]

[Time: Three Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B: i) Q. 1 and Q. 6 are compulsory.
ii) Solve any two questions from remaining questions from each section.
iii) Use of Steam table / mollier diagram is allowed.
iv) Figures to the right indicate full marks.
iv) Assume suitable data, if necessary.

SECTION - A

Q.1 Solve any five. 10

a) State the important property of cutting tool material.
b) Explain live and dead centre in lathe machine tool.
c) Define speed, feed and depth of cut.
d) What is mean by horizontal milling and vertical milling.
e) What is CIM?
f) Define tool life.
g) What are the types of manufacturing? Give example.
h) Define machinability.

Q.2 a) What are the types of chips? Explain in details. 08
b) Draw and explain the single point cutting tool geometry. 07

Q.3 a) Enlist work holding devices on milling machine and explain any two with neat sketch. 08
b) State the properties of cutting fluids. 07

Q.4 a) Describe with neat sketch orthogonal and oblique cutting. 08
b) Explain economics of machining. 07

Q.5 a) Explain the procedure and calculations for taper turning. 08
b) Draw and describe the tail stock and its function. 07

SECTION – B

Q.6 Solve any five. 10

a) What are the types of slotter?
b) Draw neat labeled twist drill.
c) State the principle of abrasive jet machining.
d) What do you mean by dressing and truing of grinding wheel?

e) Enlist the advantages of broaches.
f) Describe classification of boring machines.
g) What are types of grinding wheels?

Q.7 a) Enlist the types of drilling machines and explain any one with neat sketch and state its applications. 08
b) What are the work holding devices on shaper machine? Describe any two with neat sketch. 07

Q.8 a) Explain the planning operation and state its applications. 08
b) Enlist the boring defects. 07

Q.9 a) Describe the working principle of electron beam machining (EBM) and explain its working and state its applications. 08
b) Explain selection criteria of selection of grinding wheel. What is grit, grade and structure of grinding wheel? 07

Q.10 a) Describe working principle with neat sketch of chemical machining (CHM) and state its applications. 08
b) Differentiate between ECM and EDM. 07

Total No. of Printed Pages:4

SUBJECT CODE NO:- H-324
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-I)
Machine Drawing
[OLD]

[Time: Four Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

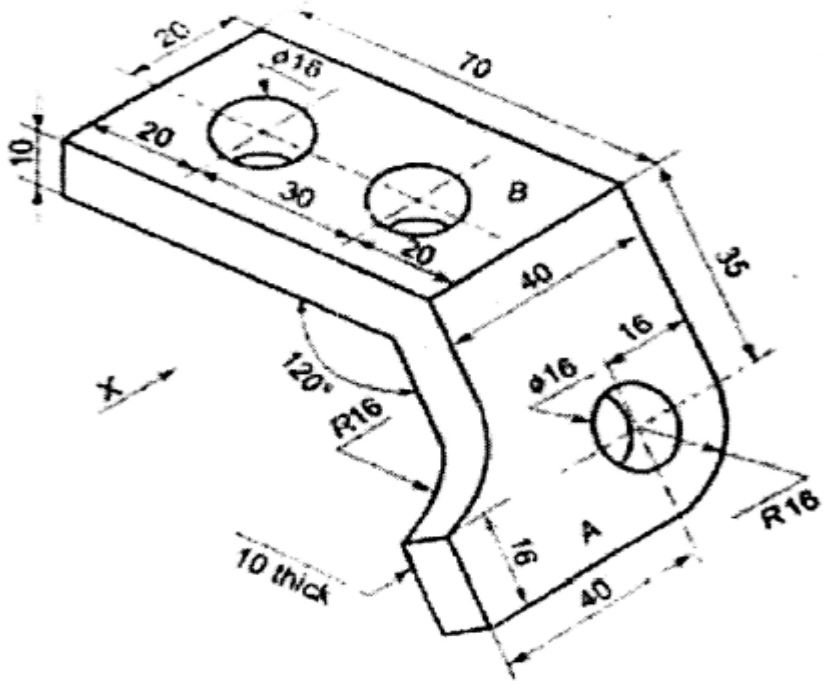
N.B
1. All the questions are compulsory.
2. Figure to the right indicates full marks.
3. Assume suitable data, if and wherever necessary.

Section A

Q.1 a) Construct an ellipse when a pair of conjugate diameters AB and CD are equal to 120mm and 50mm respectively. The angle between the conjugate diameters is 60^{o}. 08

b) Construct a rectangular hyperbola when a point P on it is at a distance of 30mm and 40mm respectively from the two asymptotes. 08

Q.2 Figure 1 shows a component. Draw front view from direction X, top view and right hand side view. Also draw the auxiliary view of the inclined portion. 12



OR

12

Figure 2 shows front view and left hand side view of an object, draw the isometric view.

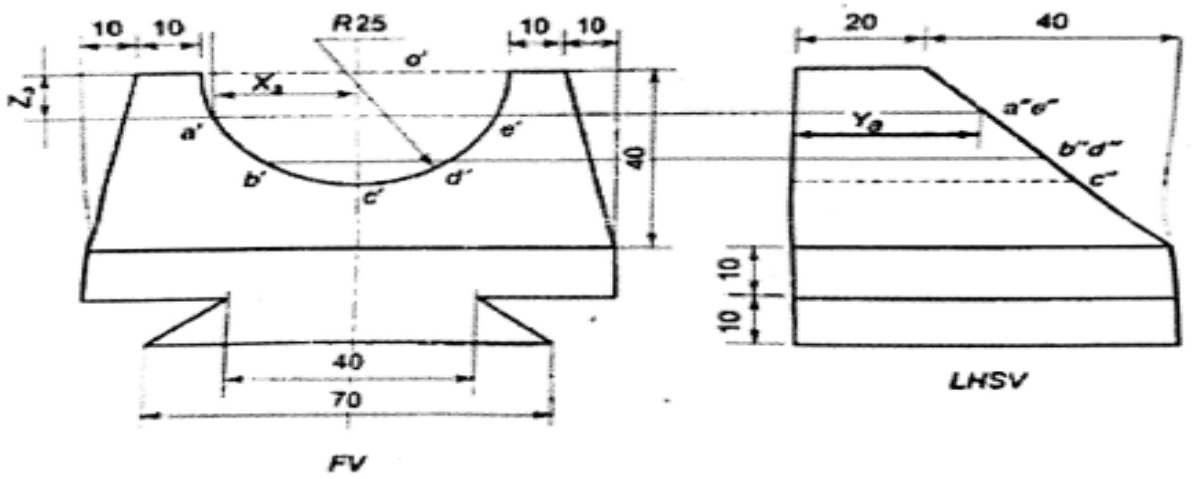


Figure.2

Q.3 A cone 60mm in diameter at its base and an axis 65mm long is resting on its base. A horizontal cylinder of 35mm diameter penetrates the cone such that the axis of the cylinder intersects that of cone 20mm above the base of the cone. Draw the projections and show curve of intersection. 12

OR

A vertical cylinder having base diameter 60mm and axis length 90mm is completely penetrated by a horizontal cylinder of same size such that their axes are 10mm apart. Draw the projections and show curve of intersection. 12

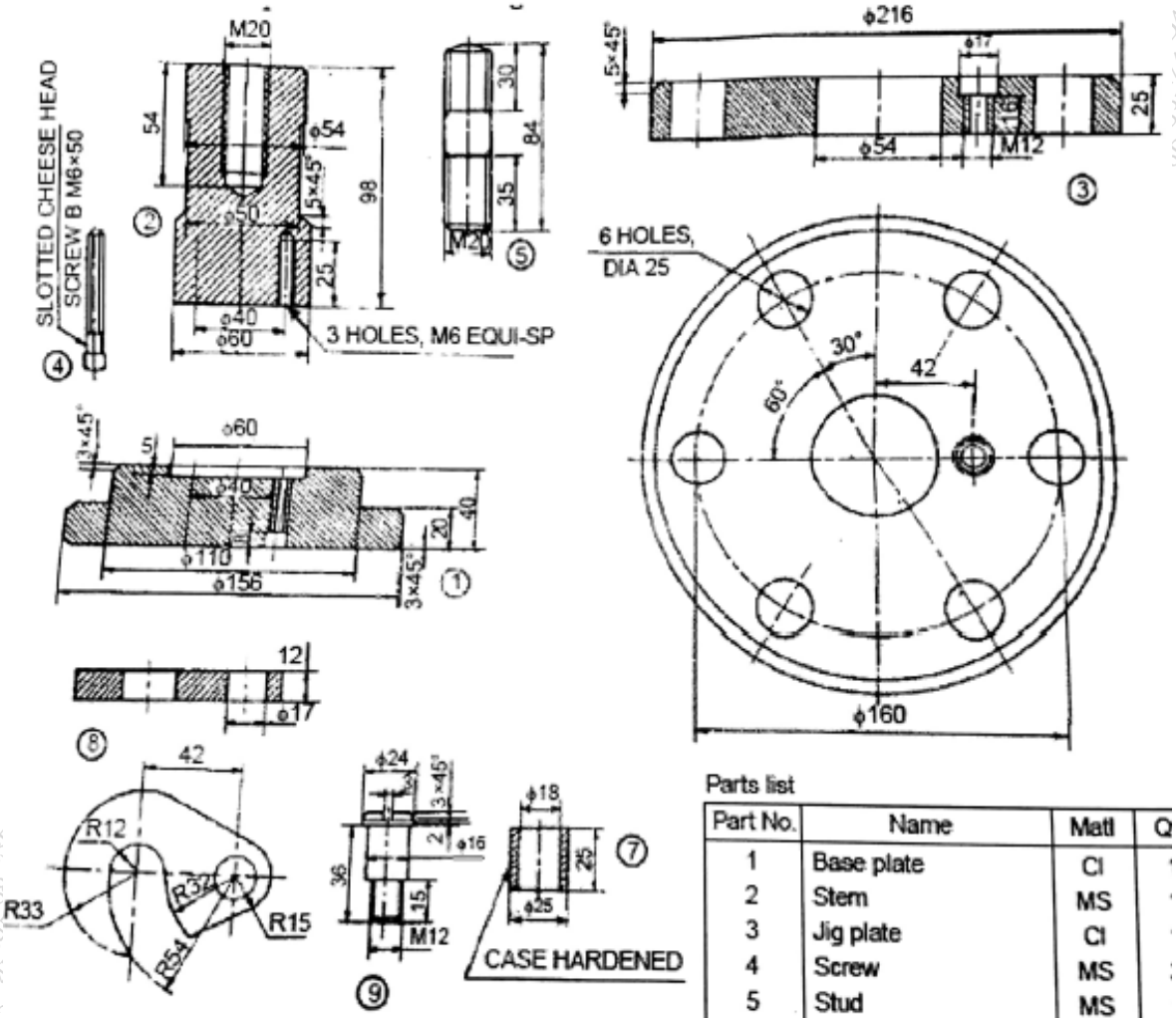
Section – B

Q.4 Draw the conventional representation of the following 15

1) Rubber material
2) Cast iron
3) Bearing
4) Helical compression spring
5) Draw a figure showing chain dimensioning
6) Upper deviation
7) Transition fit
8) Bilateral tolerance
9) Cylindricity tolerance
10) Double J butt weld
11) Spot weld
12) Surface roughness grade N7
13) Define allowance
14) Define surface roughness
15) Machining symbol when material removal is not permitted

Q.5 Figure 3 shows details drill jig along with its part list. Prepare the following views 25

a) Sectional front view
b) Top view



Parts list

Part No.	Name	Matl	Q
1	Base plate	CI	
2	Stem	MS	
3	Jig plate	CI	
4	Screw	MS	
5	Stud	MS	
6	Nut M20	MS	
7	Bush case hardened	Steel	
8	Latch washer	MS	
9	Screw	MS	

Figure.3

OR

Figure 4 shows assembly of screw jack along with its part list. Draw the detailed drawings of all the parts in front and top views. 25

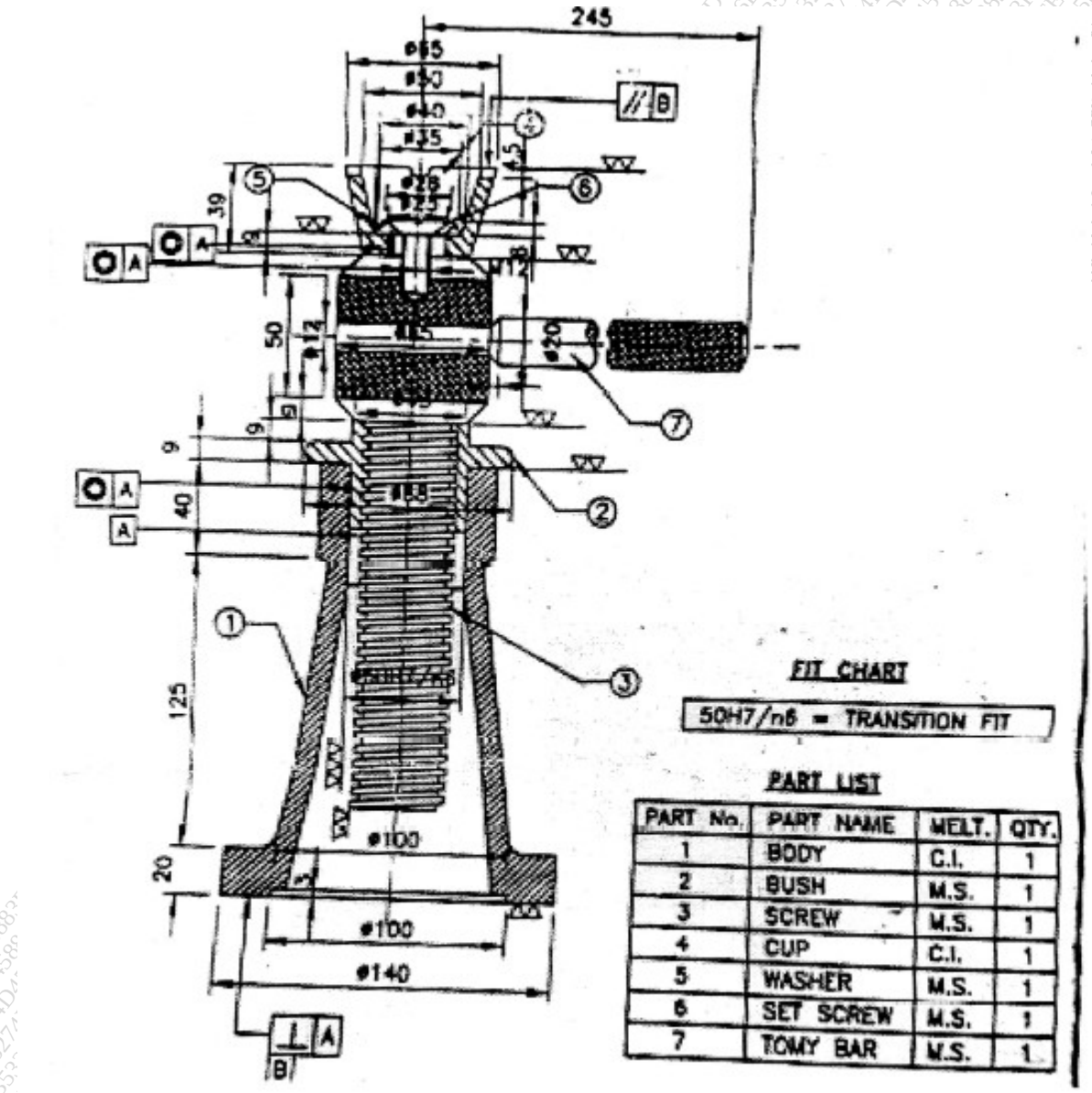


Figure-4

Total No. of Printed Pages:4

SUBJECT CODE NO:- H-325
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mechanical) (Sem-I)
Machine Drawing
[Revised]

[Time: Four Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B
i. Q.1 and Q.4 are compulsory
ii. Assume suitable data if necessary
iii. All dimensions are in mm.

SECTION – A

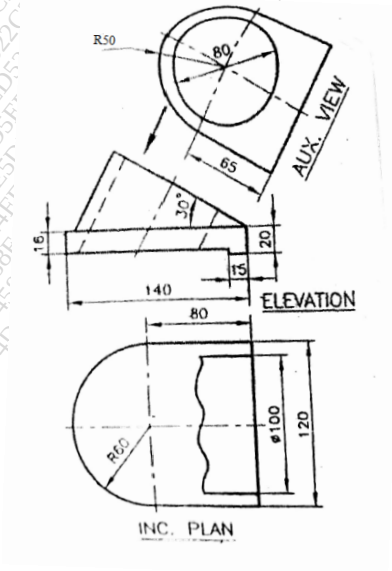
Q.1 A vertical cylinder of 60 mm diameter and 90 mm long is completely penetrated by another cylinder of 40 mm diameter and 90 mm long. The axis of horizontal cylinder is parallel to both H.P and V.P. and is 5 mm away from the axis of vertical cylinder. Draw the curves of intersection. 14

Q.2 A hexagonal prism, side of base 30 mm and height 90 mm is resting on its base in H.P. with one of its rectangular faces parallel to V.P. A hole of diameter 60 mm is cot in it. The axis of the hole is perpendicular to the V.P. and 10 mm away from axis of the prism. Develop the lateral surface of the prism when the axis of the hole is 45 mm above the H.P. 13

OR

A right circular cone of 60 mm diameter of base and 60 mm length of axis is resting on its base on the ground with axis vertical. It is cut by two vertical section planes 15 mm from either sides of the axis. Draw the development of the larger portion of the cone.

Q.3 Figure 1 shows front view, incomplete top view and partial auxiliary view of "Bevel washer". Redraw the front view and complete top view. 13



OR

Front view and partial auxiliary view of an object are as shown in figure 2 Draw given front view and top view of object.

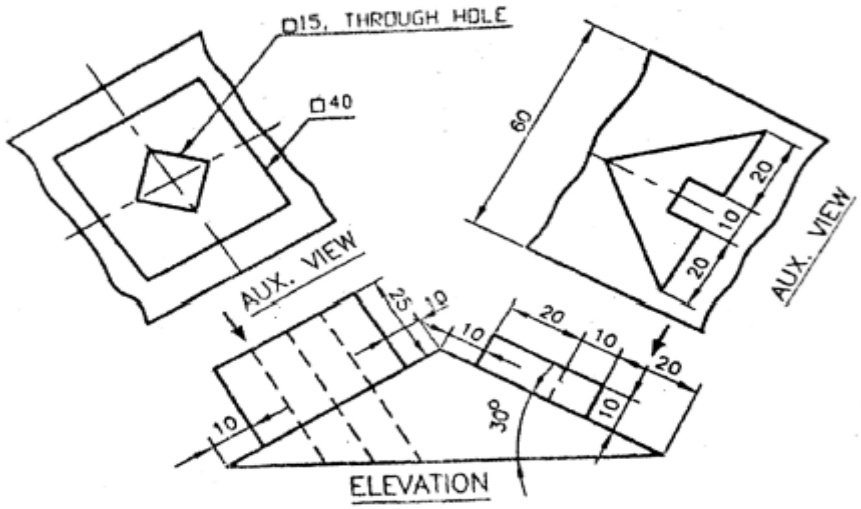


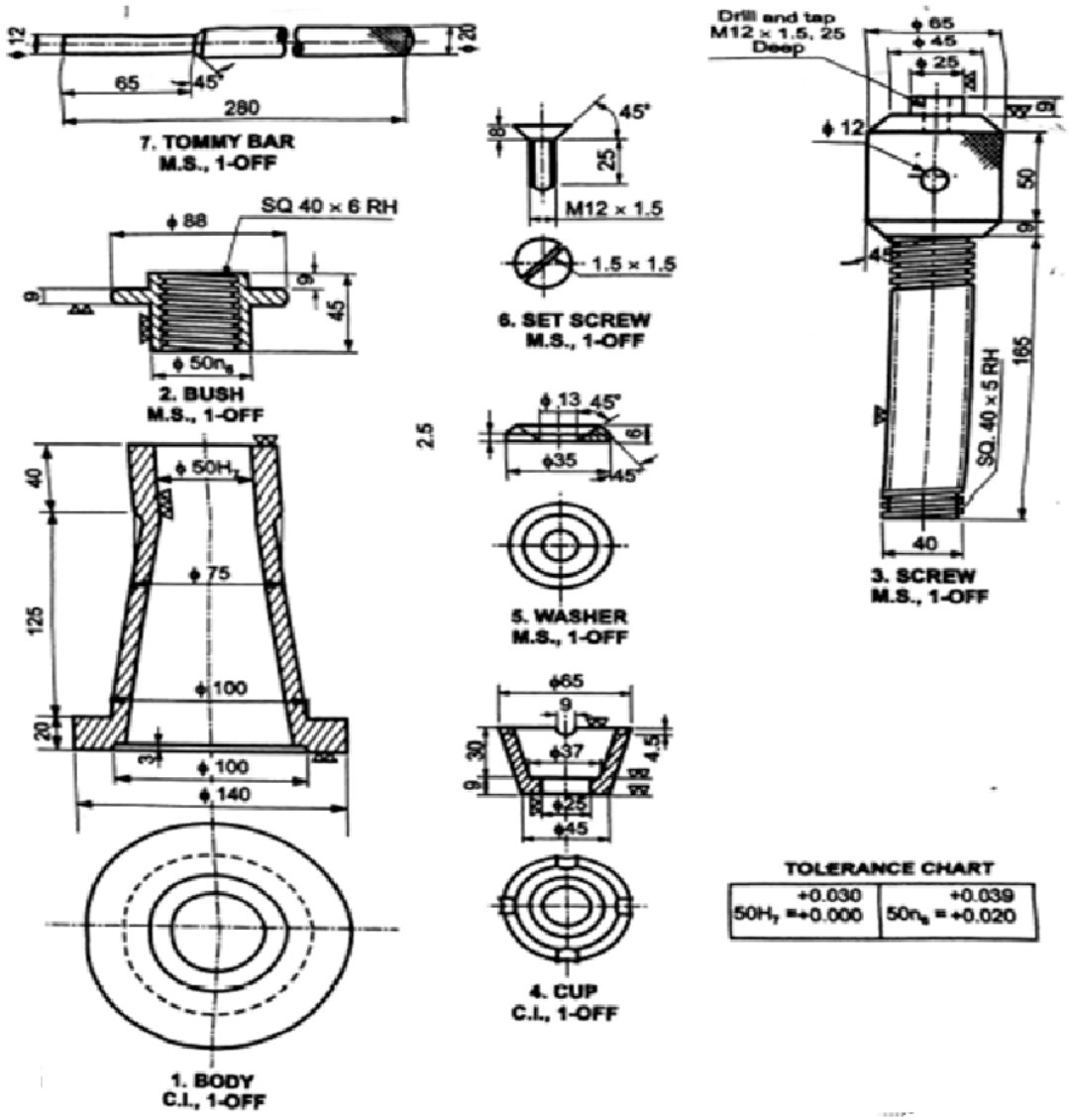
Figure.2

SECTION – B

Q.4 Solve any five questions form following. 15

a) Draw the material conventions of
   i) Glass
   ii) Wood
   iii) Aluminium and its alloy
b) Eye foundation bolt.
c) Expansion pipe joint
d) Double riveted lap joint
e) Give the symbols of following welded joints
   i) Seam weld
   ii) Single 'J' butt weld
   iii) Single 'U' butt weld
f) Give surface roughness values and symbol for
   i) N 11
   ii) N 8
   iii) N 5

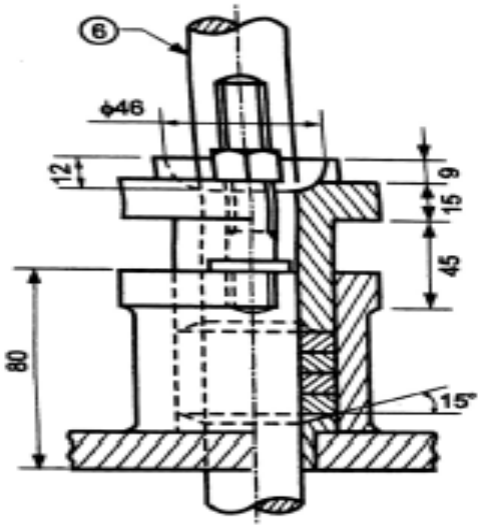
Q.5 Figure 3 shows details of screw jack assemble all parts and Draw sectional front view and top view. Also tabulate bill of material. 25



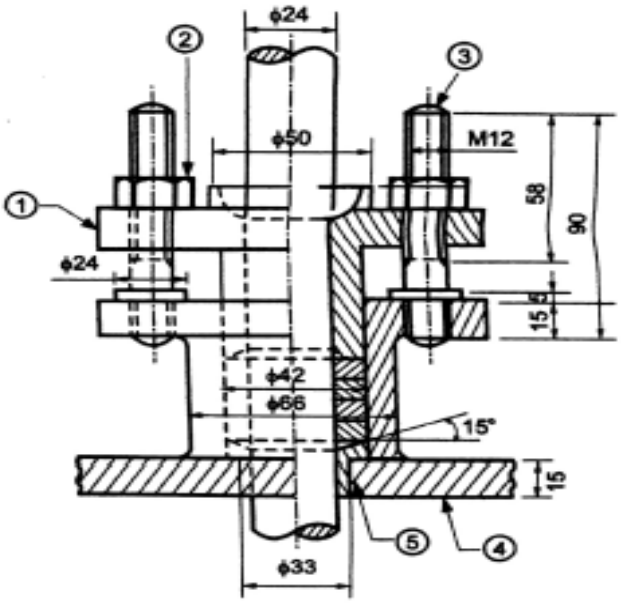
OR

Figure 4 shows assembly of stuffing box. Draw two view of following parts.

i) Body
ii) Gland
iii) Nut
iv) Shaft



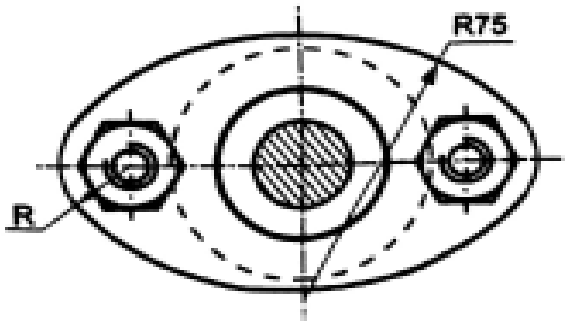
Right Hand Side View



Front View

PART LIST

Part No.	Part Name	Material	Quantity
1.	Body	C.I.	1
2.	Nut, M12	M.S.	2
3.	Bush	Brass	1
4.	Stud	M.S.	2
5.	Gland	Brass	1
6.	Shaft	M.S.	1



Top View

H-359

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-359
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-I)
Thermodynamics-I
[OLD]

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
(i) Q.1 and Q.6 are compulsory.
(ii) Solve any two questions from remaining questions from each section.
(iii) Use of Steam table/mollier diagram is allowed.
(iv) Figures to the right indicate full marks.
(v) Assume suitable data, if necessary.

SECTION A

Q.1 Solve any five of the following (10)

a. What is PMM-1? Explain.

b. Define heat pump.

c. Draw constant entropy process on PV and TS diagram.

d. Explain working of heat exchanger.

e. Explain flow work.

f. What do you mean by available energy?

g. State Kelvin plank statement.

h. What is principle of increase in entropy?

Q.2 a. Derive an expression $w = -\int v.\,\mathrm{dp}$. (07)

b. A blower handles 1 kg/s of air at 20° C and consumes power of 15 KW. The inlet and outlet velocities of air are 100 m/s and 150 m/s respectively. Find exit air temperature assuming adiabatic condition. Take C_P of air 1.005 kJ/kgK. (08)

Q.3 a. Prove the equivalence of Kelvin plank and clausius statement of second law of thermodynamics. (07)

b. A reversible heat engine supplied with heat from two constant temperature sources at 900 K and 500 K and reject heat too low temperature reservoir at 300 K. Assuming the engine to execute number of complete cycles, while developing 70 kW and rejecting 53 kW. Calculate heat supplied by each source and efficiency of the engine. (08)

Q.4 a. Discuss applications of entropy principle. (07)

b. Show that entropy is property of system. (08)

Q.5 Write short note on any three (15)

a. Difference between steady flow and non-flow process
b. Refrigerator
c. Temperature entropy diagram
d. Carnot theorem

SECTION B

Q.6 Solve any five (10)

a. What do you mean by higher calorific value and lower calorific value?
b. What is phase?
c. Write assumptions in power cycle.
d. Explain critical point.
e. Draw PV and TS diagram of brayton cycle.
f. State devices used for determining dryness fraction.
g. Define wet steam and superheated steam.
h. What is fuel what are its types.

Q.7 a) Derive expression for mean effective pressure of diesel cycle. (07)

b) A gas turbine plant operates on Brayton cycle between Tmin=300k and Tmax 1073k. Find maximum work done per kg of air and corresponding cycle efficiency. How does this efficiency compare with the carnot efficiency operating between same to temperatures? (08)

Q.8 a) Draw a neat sketch of separating and throttling combined calorimeter and explain its working. (07)

b) A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250° C. The mass of liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy and internal energy. (08)

Q.9 a) Methane is burnt with atmospheric air. The analysis of products on a dry basis is as follows
CO_2 10%, O_2 2.37%, CO 0.53%. N_2=87.10%.
calculate the air fuel ratio and percentage of theoretical air and determine combustion equation. (08)

b) Discuss phase transformation of water at constant pressure. (07)

Q.10 Write note on any three (15)

a. Pure substance
b. Otto cycle
c. Stoichiometric air
d. Orsat apparatus

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-360
FACULTY OF SCINECE AND TECHNOLOGY
S.E. (Mechanical) (Sem-I)
Thermodynamics-I
[Revised]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Q.1 and Q.6 are compulsory.
2. Solve any two questions from remaining questions form each section.
3. Use of Steam table / mollier diagram is allowed.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.

SECTION -A

Q.1 Solve any five 10

a. State assumption of steady flow process.
b. Derive equation for nozzle from SFEE.
c. What do you mean by unavailable energy?
d. Explain perpetual motion machine of first kind.
e. State Carnot theorem.
f. Define non flow work.
g. Draw isothermal process on PV and TS diagram.
h. Define heat pump.

Q.2 a. In steam power station steam flows steadily through 0.25 m diameter pipe line from a boiler to the turbine. At the boiler end, the steam conditions are found to be, pressure 4 MPa, temperature 400℃ , enthalpy 3213 6.6 kJ/kg and specific volume 0.073m^3/kg. At the turbine end conditions are found to be pressure 3.5 MPa, temperature392℃ , enthalpy 3202.6 kJ/kg and specific volume 0.084m^3/kg. There is heat loss of 8.5 kJ/kg from pipeline. Calculate steam flow rate. 08

b. Discuss concept of PMM- I and PMM- II. 07

Q.3 a. A reversible refrigerator is used to maintain a space at a temperature of - 5℃, when its rejects heat to the surrounding at 30℃ . If the heat removal rate from refrigerator is 100 MJ/ hour. Determine COP of system. 08

b. A heat pump is used to maintain an auditorium Hall at 25℃ when atmospheric temperature is 10℃. the heat load of the hall is 1550 kJ/minute. Calculate the power required to run actual heat pump if the COP of the actual heat pump is 32 % of Carnot heat pump working between same temperature limits. 07

Q.4 a. State and explain second law of efficiency. 07

b. Explain principle of increase in entropy of universe. 08

Q.5 Solve any three of the following 15

a. Limitations of first law of thermodynamics
b. Dead state
c. clausius theorem
d. Difference between heat pump and refrigerator

SECTION – B

Q.6 Solve any five questions from the following 10

a. Write assumptions of air- standard cycle.
b. Define mean effective pressure.
c. Define critical point.
d. Define dryness fraction of steam.
e. Draw Brayton cycle PV and TS diagram.
f. Draw Carnot cycle on PV and TS diagram.
g. Define fuel what are its importance.
h. Define air to fuel ratio.

Q.7 a. Explain phase change diagram for pure substance. 07

b. The minimum pressure and temperature in an auto cycle are 100KPa and27℃, the amount of heat added is 15000 kJ/kg. Calculate pressure and temperature at all point assuming compression ratio of 8. 08

Q.8 Percentage composition of liquid fuel is C = 88% and $H_2 = 12\%$ by mass calculate 15

i) Mass of air required per kg of fuel
ii) Product of combustion by volume if 16% excess air is supplied.

Q.9 a. Derive an expression for enthalpy of wet steam. 04

b. Steam at 8 bar and 250℃ is flowing at rate of 1.5 kg/s passes through a pipe carrying wet steam at 8 bar and 0.98 dry. After adiabatic mixing the flow rate is 2.8 kg/s. determine condition of steam after mixing. The mixture is further expanded in nozzle isentropically to a pressure of 4 bar. Determine velocity of steam leaving nozzle. 11

Q.10 Write note on any three 15

a. Orsat apparatus
b. Triple point
c. Comparison of Otto, Diesel and Duel cycle on basis of same compression ratio.
d. Entropy of steam.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-393
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-I)
Production Processes-I
[OLD]

[Time: Three Hours] **[Max. Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Question No.1 from Section A and Q. No.6 from Section B are compulsory.
2) Attempt any two questions from Q. No.2 to Q. No.5 in Section A and any two Question from Q.No.7 to Q.No.10 in Section B.
3) Figures to the right indicate full marks.
4) Assume suitable data whenever necessary.

Section – A

Q.1 Attempt any five questions from the following 10
a) What is function of gate
b) Why sprue should be tapered
c) Draw neat sketch of embossing
d) Compare hot and cold working
e) What is pressure die casting
f) List all operation carried out in sheet metal working
g) What are types of dies
h) What is function of flywheel
i) State application of open and close die forging.
j) Draw neat sketch of rotary swaging

Q.2 a) Explain any two pattern used in Foundry with application 08
b) State properties of mould sand. 07

Q.3 a) Discuss investment casting with example. 08
b) When permanent mould casting is used. 07

Q.4 a) Draw neat sketch of press and explain working of press 07
b) Explain the following sheet metal processes 08
i) Blanking
ii) Punching
iii) Slitting
iv) Lancing

Q.5 Write short note on any three 15
a) Pattern material
b) Classification of sand mould
c) Type of power hammer
d) Roll bending

Section – B

Q.6 Solve any five 10

a) Why additives are used in Plastics
b) State uses of laminating plastics
c) Draw neat sketch of calendaring
d) State application of resistance welding
e) Name different weld testing methods
f) Enlist types of coating in power coating
g) Enlist safety equipment in welding
h) State principle & ultrasonic welding
i) What is Galvanizing
j) Compare AC and DC power sources.

Q.7 a) What is extrusion moulding state its advantages, disadvantages and application. 06
b) Explain working principle of Rational moulding stating its advantages and disadvantages. 09

Q.8 a) With neat sketch explain submerged arc welding. 07
b) What is friction welding? Give application. 08

Q.9 a) Classify resistance welding? Explain seam welding with neat sketch. 07
b) What is Laser beam welding? Explain giving example Laser beam welding process. 08

Q.10 a) What is powder coating? List down the advantages and limitation of powder coating. 08
b) What are various cleaning processes? Explain mechanical cleaning process. 07

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-394
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mechanical) (Sem-I)
Production Processes
(Revised)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B 1) Question No.1 & 6 are compulsory.
2) Solve any Two questions from Q.2 to 5 & 7 to 10

Section A

Q.1 Solve any Five 10

(a) Justify role of Riser in casting
(b) What types of fuels are used in furnaces?
(c) Discus the need of testing moulding sand.
(d) Enlist Inspection methods of casting.
(e) What do you understand by closed die forging.
(f) What is role of chaplets in casting process.
(g) Which types of joints can be used in sheet metals?
(h) What is mandrel?
(i) How slitting operation is done?
(j) What principle is used in bending?

Q.2 (a) Explain Gating system with neat sketch 08
(b) What is permanent mould die casting? How centrifugal casting works? 07

Q.3 (a) Explain working of Indirect & Direct Arc electric furnaces. 08
(b) Brief about Pattern allowances to be considered ? 07

Q.4 (a) Describe different types of rolling mills. 08
(b) How to manufacture seamless pipe & tube? 07

Q.5 Write short note on any THREE 15

(i) Sheet metal operations
(ii) Sheet metal Joints
(iii) Presses used in sheet metal
(iv) Embossing & coining

Section B

Q.6 Solve any Five 10

(a) Signify role of additives in plastics
(b) Where to use thermosetting & thermoplastic?
(c) Justify working principle of Transfer Moulding.
(d) What are the fluxes used in welding processes?
(e) On what principle ultrasonic welding is done?
(f) How MIG differs from TIG?
(g) What is the need of providing shielding in welding?
(h) What is solid state welding?
(i) Discuss the need of surface treatment
(j) Why to clean surface before coating?

Q.7 (a) Explain MIG & TIG with neat sketch. 08
(b) Brief about LASER beam welding process. 07

Q.8 (a) With neat sketch explain ultrasonic welding 08
(b) How Gas Welding works? 07

Q.9 a) How Transfer moulding can be performed and advantageous over compression moulding? 08
b) Describe about calendering& Laminating in plastics. 07

Q.10 Write short note on any THREE 15

(a) Mechanical cleaning
(b) Chemical cleaning
(c) Electroplating
(d) Powder coating

H-428

Total No. of Printed Pages:03

SUBJECT CODE NO:- H-428
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-I)
Strength of Material
[OLD]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Q.No.1 and Q.No.6 are compulsory.
2) Attempt any two questions from the remaining questions in each section.
3) Assume suitable data, if necessary

Section A

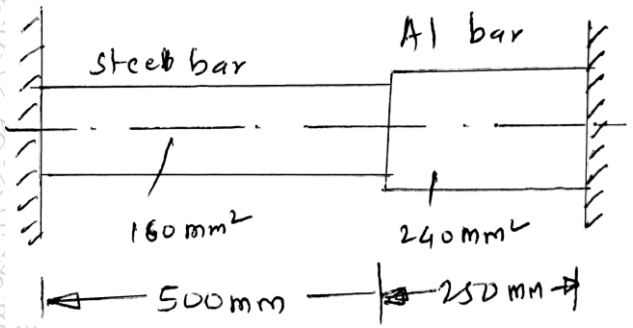
Q.1 Attempt any five 10

1. Define Hooks law
2. Define modulus of rigidity
3. What is yield point
4. Explain volumetric stress & strain
5. Define bulk modulus
6. State relation between shear force and Bending moment
7. State type of bending with example.
8. Explain type of beams
9. What is radius of gyration
10. Compare vertical and horizontal shear

Q.2 A composite bar made up of aluminium and steel is held between two supports a shown in figure 1. The bars are stress free at the temperature of 42^0c what will be the stresses in the two bars when the temperature drops to 24^0c if 15

a) The supports are un-yielding

b) The supports come nearer to each other by 0.1mm. The cross-sectional area of steel bar is 160 mm^2 and that of aluminium bar is 240 mm^2 Take E of aluminium as $0.7x10^5$ N/ mm^2 and steel $2x10^5$ N/ mm^2 $\alpha_{Al} = 24 \times 10^{-6}$ per^{0}c and $\alpha_{st} = 12 \times 10^{-6}$ per^{0}c



Q.3 a) Derive relation between modulus of elasticity and Bulk modulus 08

b) The modulus of rigidity for a material is 0.5×10^5 N/ mm^2 A 12 mm diameter 07

rod of the material was subjected to an axial pull of 14 KN and the change in diameter was observed to be 3.6×10^{-3} mm. Calculate Poisson's ratio and modulus of elasticity

Q.4 a) For the beam as shown in figure 2 draw BM and SF diagrams indicating principle values 10

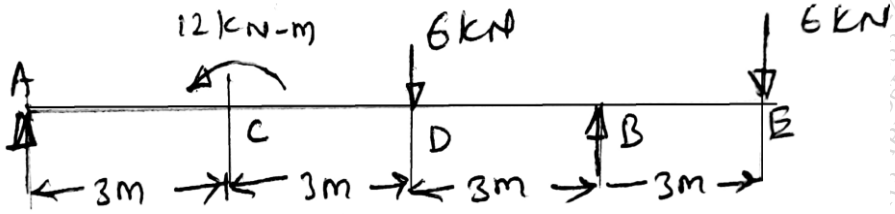


Figure 2

b) State assumption during analysing beam bending 05

Q.5 A 500×500 mm timber is strengthened by the addition of 500 mm $\times$ 8 mm steel plates secured to its top and bottom surface The composite beam is simply supported at its ends and carries a uniformly distributed load of 100 KN/m min over an effective span of 6m Find the maximum bending stresses in steel and timber at the mid span Take Es=2×10^5 N/ mm^2 $E_T = 0.1 \times 10^5$ N/ mm^2 15

Section B

Q.6 Attempt any five 10

1) Define Direct and bending stress
2) What is angle & twist
3) State torsional equation with usual notation
4) Define major principle stress
5) Define longitudinal stress
6) What is thin cylinder
7) Define proof resilience
8) Compare gradual and impact load
9) Define slope and deflection of beam
10) What is statically indeterminate beam

Q.7 a) A round steel rod ACB, 1.8 m long is firmly held at its ends A and B. AC is 1.2m and 50 mm dia, BC is 0.6 m and 40 mm dia. At C, a twisting couple of moment 580 NM is applied. Find the moment of resisting couples at A and B and the maximum shear stresses in parts AC and BC of the rod. 08

b) A hollow rectangular masonry pier 600 mm x 900 mm and 150 mm thick transmits a vertical load of 500 KN in a vertical plane bisecting the 900 mm side and at an eccentricity of 100 mm from the geometrical axes of the section. Determine the maximum and minimum stress intensities in the section. 07

Q.8 a) A piece of material is subjected to two perpendicular stresses as follows 08
a) Tensile stresses of 100 mpa and 60 mpa

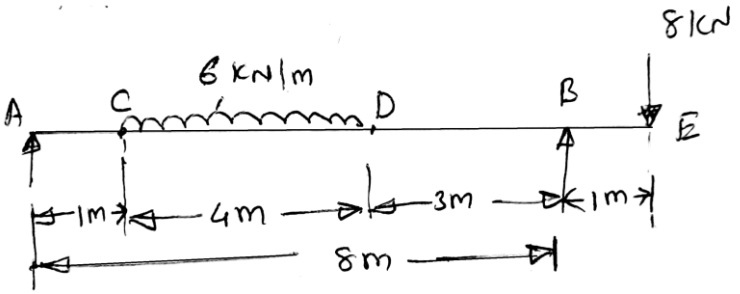
b) Tensile stress of 100 mpa and compressive stress of 60 mpa
c) Compressive stress of 100 mpa and tensile stress of 60 mpa
d) Compressive stress of 100 mpa and 60 mpa
Determine normal and tangential stresses on a plane inclined at 30^0 to the plane of 100 MPa stress Also find the resultant and its indicators with the normal stress

b) What is principles plane and principles stresses? State its applications 07

Q.9 a) A hammer having a mass of 8 kg falls 1m on a 60 mm Cube iron block before coming to rest Find the distance the block will be compressed and the instantaneous stress induced in it Also, determine the velocity with which the hammer will strike the block $E=2.05x10^5$ N/mm^2 08

b) Derive an equation for change in dimension of thin cylinder due to internal fluid pressure 07

Q.10 For the given simply supported beam as shown in figure 3 Determine deflection of the free end and the maximum deflection between A and B 15
$E = 210$ GPa and $l = 20 \times 10^6$ mm^4



Total No. of Printed Pages:03

SUBJECT CODE NO:- H-429
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mechanical) (Sem-I)
Strength of Material
[Revised]

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1) Q.No1 and Q.No.6 are compulsory-Attempt any two from remaining from each section.
2) Figures to right indicate full marks.
3) Assume suitable data if necessary.

Section A

Q.1 Attempt any five 10

1) State example of tensile & compressive stresses
2) Draw neat sketch of stress strain diagram for ductile material.
3) Explain Principle of superposition
4) Give importance of Bulk modulus
5) State Interrelationship between elastic constants
6) State assumption while analysis of bending
7) State example of shear stresses in beams
8) State shear stress equation for beam

Q.2 a) Prove that volumetric strain due to single Direct. Stress is given by volumetric strain $e_v = \frac{P}{E}(1 - \frac{2}{m})$ The notations have usual meaning 10

b) Explain Linear and Lateral strains with relation between them 05

Q.3 a) A brass bar having c/s area of 1000 mm^2 is subjected to axial force as shown in figure 1. Find total elongation of bar. E brass = 100 x 10^3 N/mm^3 07

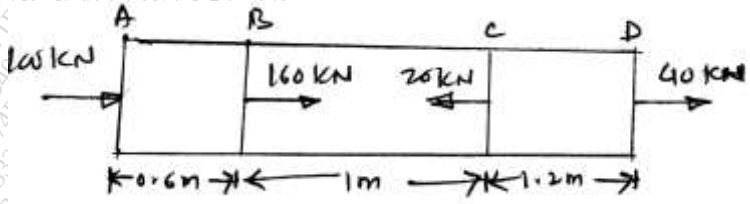


Figure 1

b) A steel Rod 30 mm diameter and 5 m long is connected to Two grips and Rod are maintained at temp of 100^0C Determine the stress and Pull exerted when temperature falls to 30^0C If 08

a) Ends do not yield

b) Ends yields at 0.12 mm
$E = 2.1 \times 10^5$ MPa $\quad \alpha = 12 \times 10^{-6}/^0C$

Q.4 A T section having Flange 150 mm wide and 20 mm thick and web 180 mm x 20 mm carries as UDL of 50 KN/m over simply supported span of 10m calculate the maximum tensile and compressive bending stresses 15

Q.5 a) A steel section shown in figure 2 is subjected to a shear force of 200 KN. Draw shear stress distribution diagram Also find the ratio of maximum shear stress to average shear stress 10

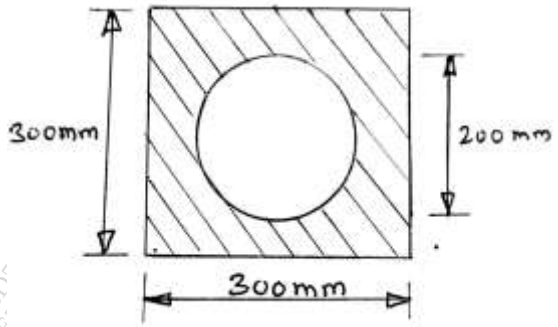


Figure 2

b) Explain shear force and Bending moment diagram with point of contra flexture 05

Section B

Q.6 Attempt any five 10

a) Why shaft is subjected to torsion
b) State basic torsion equation with usual notation
c) Draw neat sketch showing principle plane, principal shear stress (maximum & minimum)
d) Define Hoop stress
e) What is proof resilence
f) Define strain energy showing on graph
g) What is UDL
h) State equation of McCauley's method

Q.7 a) A circular rod of 20mm diameter cames a pull along a line which is parallel to the centroidal axis, but is placed from it Determine the distance of the line of pull from the centroidal axis, if the maximum stress is 20% greater than the mean stress on a section normal to the axis 07

b) A hollow steel shaft 5 m long is to transmit 160 kw of power at 120 rpm the total angle of twist is not to exceed 2^0 in this length and the allowable shear stress is 50 N/mm^2 Determine the inside and outside diameter of the shaft $G = 0.8 \times 10^5$ N/mm^2 08

Q.8 a) The stresses on two mutually perpendicular planes through a point in a body are 80 MPa and 50 MPa both tensile. Determine the maximum value of the shear stress which can be applied so that the maximum value of the permissible principle stress is limited to 120 MPa. What will be the inclination of the principle stress and the magnitude of the maximum shear stress. 10

b) Write short note on Mohr's circle of stress. 05

Q.9 a) A 600 mm long steel cylinder is made up of 4 mm thick plates, The inside diameter of the cylinder is 120 mm when it is subjected to internal pressure of 5 MPa, the increase in its volume is 5000 mm^3. Determine the value of poisson's ratio and modulus of rigidity E = 205 GPa 07

b) A weight of 2 KN is dropped on to a collar at the lower end of a vertical bar 3m long and 28mm in diameter. Calculate the maximum height of drop if the maximum instantaneous stress is not to exceed 140 MPa. What is the corresponding instantaneous elongations? Also find the dynamic force at instant of maximum elongation. 08

Q.10 a) The simply supported load as shown in fig 3 If the slope at the ends of beam is not to exceed 1^0 Find Deflection at the center of the beam 10

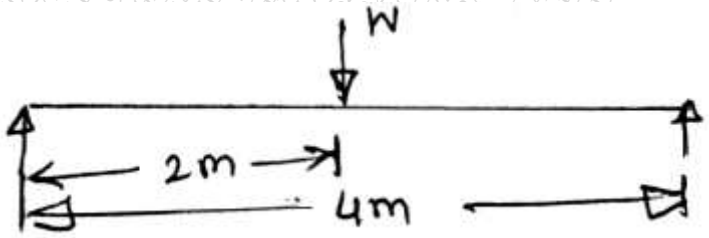


Figure 3

b) Macaulay's method of deflection Discuss. 05

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1026
FACULTY OF SCINCE AND TECHNOLOGY
S.Y.B.Tech. (Mech/Prod) (Sem-IV)
Applied Thermodynamics
[OLD]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1. Assume suitable data, if necessary.
2. Q.No.1 and Q.No.6 are compulsory.
3. Solve any two questions from remaining in each section.
4. Use steam table is permitted.

Section A

Q.1 Solve any five of the following: 10
a) Define Fuel and Combustion?
b) Define higher heating value of fuel?
c) Define equivalent of evaporation?
d) Define boiler draught?
e) Classify nozzle and draw a neat sketch of nozzles?
f) Define coefficient of discharge for a nozzle?

Q.2 a) The ultimate analysis of a solid fuel is as follows: 08
C 78%, O_2 3%, $H_2$3%, S 1%, moisture 5% and ash content 10% calculate the mass of air supplied also individual and total mass of products of per kg of fuel if 30% of excess air is supplied for condition.

b) Derive an equation for minimum mass of air required for complete combustion of fuels? 07

Q.3 a) A boiler produces 2500 kg of steam per hour at a pressure of 12 bar absolute from feed water at 30^0C. The coal having a calorific value of 30400 kJ/kg is used at the rate of 275 kg/hr. this steam is sampled by means of a throttling calorimeter in which the pressure is 1.05 bar absolute and the temperature after throttling is 110^0C. Determine the efficiency of the boiler. 08

b) Prove that the draught produced in mm of water by a chimney, is given by: 07

$$h = 353\,H\left(\frac{1}{T_1} - \frac{m+1}{m\,T_2}\right) mm\ of\ water$$

Q.4 a) Air at a pressure of 20 bar and at a temperature of 18^0C is supplied to a convergent divergent nozzle having a throat diameter of 1.25 cm and discharge to atmosphere. The adiabatic index for air is 1.4 and characteristic gas constant is 287. Find the weight of air discharged per minute. 08

b) Prove that maximum discharge in a steam nozzle per unit area at the throat is given by, 07

$$m_{max} = A\,x\,\sqrt{\frac{2n}{n+1}\,x\,\frac{P_1}{v_1}\left(\frac{2}{n+1}\right)^{\frac{2}{n-1}}}$$

Q.5 Solve any three of the following: 15

a) Explain why excess air is used in burning of fuels?
b) Explain how atmospheric conditions and air supplied for combustion affect natural draught?
c) What are the advantages of forced draught system over induced draught system?
d) What are the sources of air leakage in a condenser?

Section B

Q.6 Solve any five of the following: 10

a) Draw P-V and T-S diagram for Carnot cycle?
b) Define work ratio?
c) Write the assumptions of air standard cycle?
d) Draw P-V and T-S diagram for Otto cycle?
e) Define compressor and classify air compressor?
f) Write the practical used of compressed air?

Q.7 a) Dry saturated steam at 15bar is supplied to an engine working on Rankine cycle. It is exhausted at 1 bar. Calculate the condition of steam after adiabatic expansion, Rankine efficiency, and specific steam consumption. Take indicated thermal efficiency as 19% 08

b) With suitable neat sketch explain Binary vapour cycle? 07

Q.8 a) Derive an expression for Otto cycle. 08

b) 1 kg of air is taken though a diesel cycle. Initially the air is at 15^0C and 1 bar. The compression ratio is 15 and heat added is 1850 kJ. Calculate the ideal efficiency and mean effective pressure. 07

Q.9 a) A single stage single acting reciprocating compressor delivers 150m^3 of free air per minute, compressing it from 1 bar to 8 bar. The speed of the compressor is 300 rpm. Ifthe clearance is 1/16th of swept volume, find the diameter and stroke of the compressor. Take L/D = 1.5 where L is the stroke and D is the bore. The value of n can be taken as 1.3. 08

b) State the types of intercooling used in the multistage air compressor. Represent on the P-V and T-S diagrams. 07

Q.10 Solve any three of the following: 15

a) Why Carnot cycle is not practicable for steam power plant?
b) Write short note on Brayton cycle
c) In practice which engine, diesel or petrol is more efficient? Explain why?
d) Discuss the effect of volumetric efficiency on performance of reciprocating compressors?

Total No. of Printed Pages:08

SUBJECT CODE NO:- H-1027
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (Mech.) CBC & Grading (Sem-IV)
Machine Drawing
[Revised]

[Time: Four Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Solve any three questions in Section A.
2) Solve any one question out of question 6^{th} , 7^{th} or 8^{th} and any one out of question 9^{th} and 10^{th} in Section B.
3) Assume suitable additional data if required.
4) Full marks include dimensioning and line work skills of drawing.

Section A

Q.1 Figure 1. shows the front view of a truncated hexagonal prism with 30 mm base edge and a 90 mm long axis resting on the H.P. with two edges of base parallel to the V.P. draw the Development of its lateral surface. 13

Q.2 A square prism of base 50 mm side and axis 90 mm long, the base of the prism is on HP with one of the base sides inclined at 30° to VP. It is penetrated by a horizontal prism, of base sides 30 mm axis 100 mm long. The two axes are parallel to VP and the base sides of the horizontal prism equally inclined to VP. Draw the projections of the solids showing lines of intersection. 13

Q.3 Figure 2. Shows front view, incomplete side view, and incomplete auxiliary view. Redraw the front view and complete the side view. 13

Q.4 A cylinder of base diameter 70mm and axis 90 mm long rests' on its base on HP. A through equilateral triangular hole of sides 30 mm is cut through the cylinder, such that the axis of the hole is parallel to HP and perpendicular to VP, withone side of the hole perpendicular to the H.P. the two axes bisects each other. Draw the projections showing curves of intersection and develop the lateral surface of the cylinder. 14

Q.5 Figure 3. shows a pictorial view of an object, draw front view in the direction of arrow-x, top view and an partial auxiliary view showing true shape of the part A, as indicated in the figure. 13

Section B

Q.6 Draw an ellipse having its major axis 140 mm and minor axis 100 mm, using arcs of circle method. 12

Q.7
a) Draw the wilding symbols for the following. (Any two) 06
1) Single-U joint 2) Lap joint 3) Tee-joint
b) Draw the conventional representation for the following materials (Any two) 06
1) Metals, 2) Glass, 3) Wood

Q.8 Draw the free hand sketches for the following. (Any two) 12

i. Capstan nut, and Ring nut ii) Eye foundation bolt,

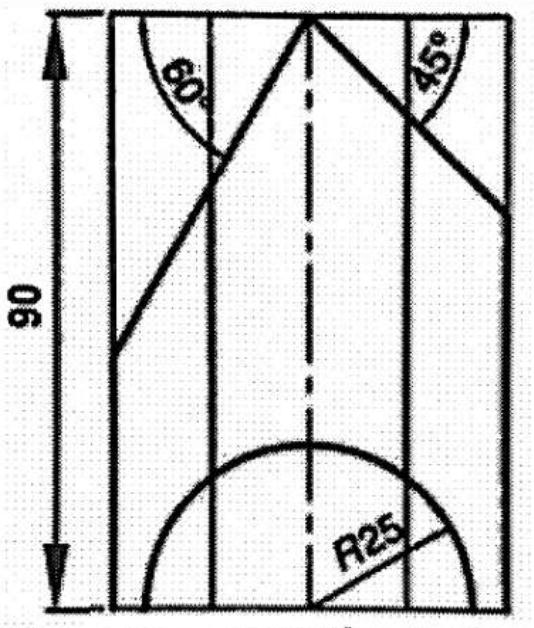
iii. Knuckle and buttress thread profile.

Q.9 The part drawings of Tail Stock are shown in figure 4, Assemble the parts and draw. 28

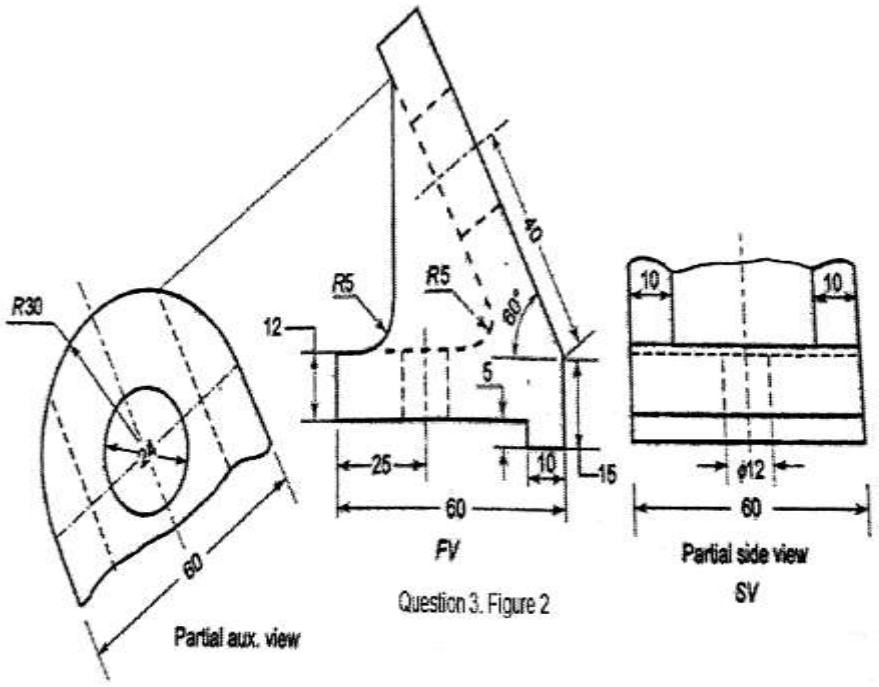
1. Half sectional front view and 2. Top view.

OR

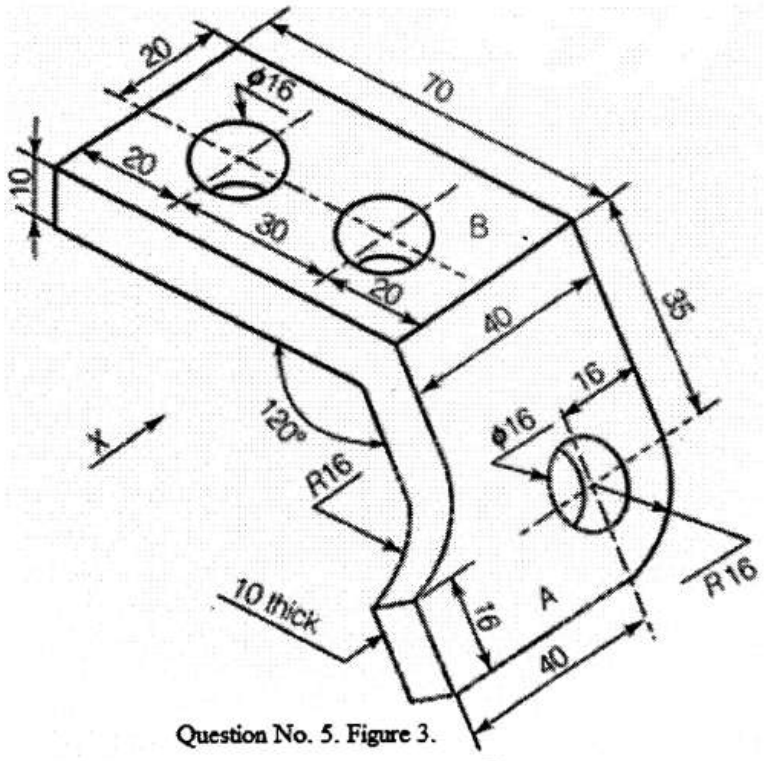
Q.10 Figure 5 shows the details of a Screw Jack. Draw the assembled views as follows 28
Sectional front view, and Top view.



Front View Question 1. Figure 1



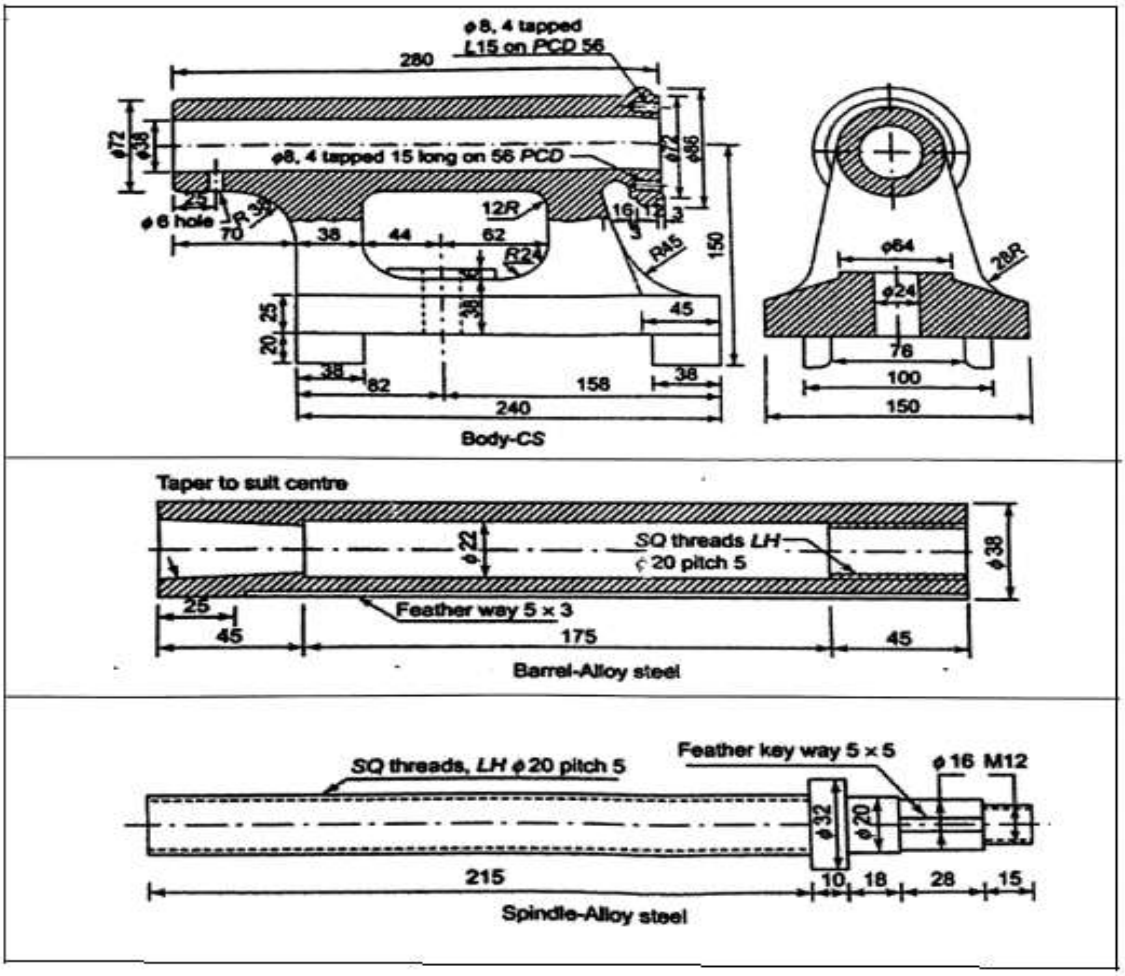
Question 3. Figure 2

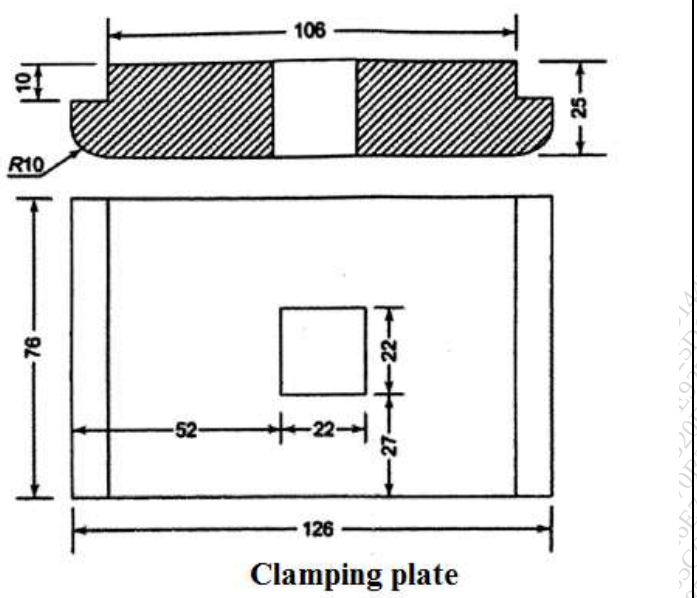


Question No. 5. Figure 3.

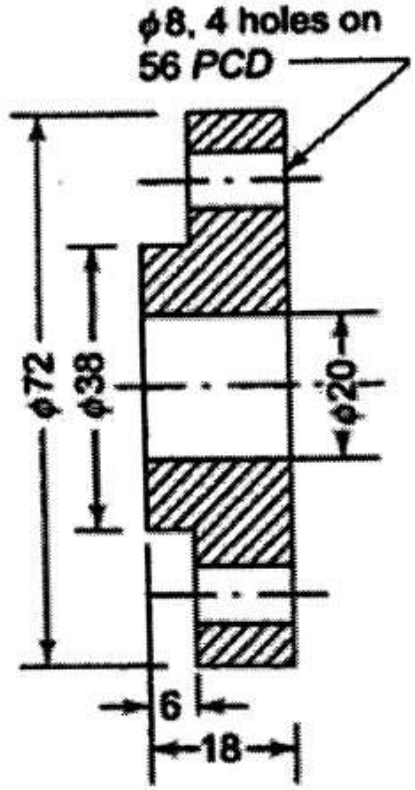
Sr. No.	Part Name	Quantity	Material
1	Tail Stock Body	1	Cast Steel
2	Barrel	1	Alloy Steel
3	Spindle	1	Alloy Steel
4	Centre	1	Alloy Steel
5	Nut, Bolt assembly	1 set	Mild Steel
6	Clamping Plate	1	Cast Steel
7	Spindle Bearing	1	Non- Ferrous
8	Feather	1 set	Non- Ferrous
9	Nut Ø 12	1	Alloy Steel
10	Washer $\emptyset\ 30x\emptyset 14x3$	1	Alloy Steel
11	Hand Wheel	1	Cast iron
12	Screw	4	Mild Steel

Figure 4 Question 9 Tailstock Bill of Material





Clamping plate



Spindle bearing

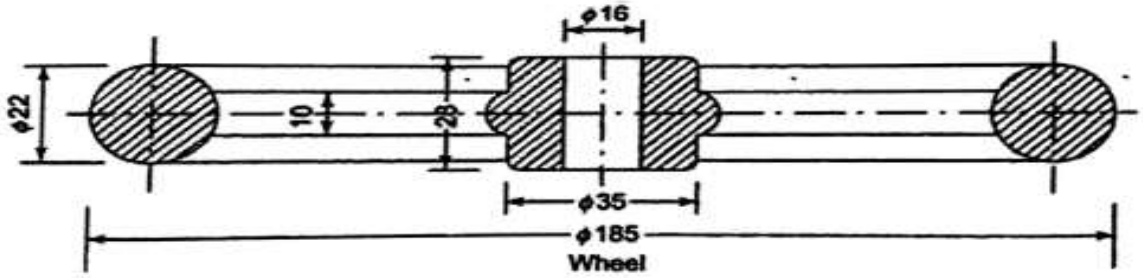
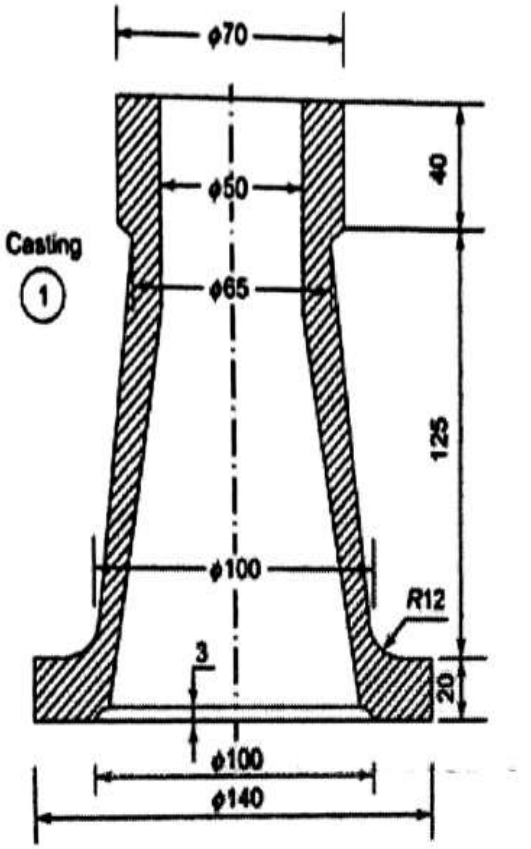
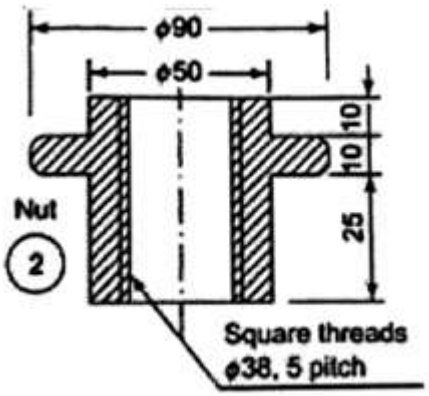
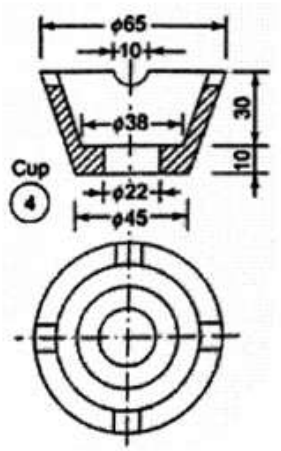
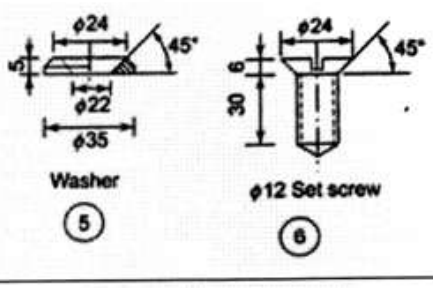


Figure 4 Question 9 Part Details of Tailstock









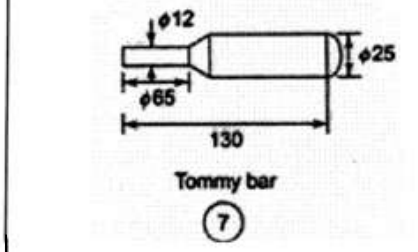
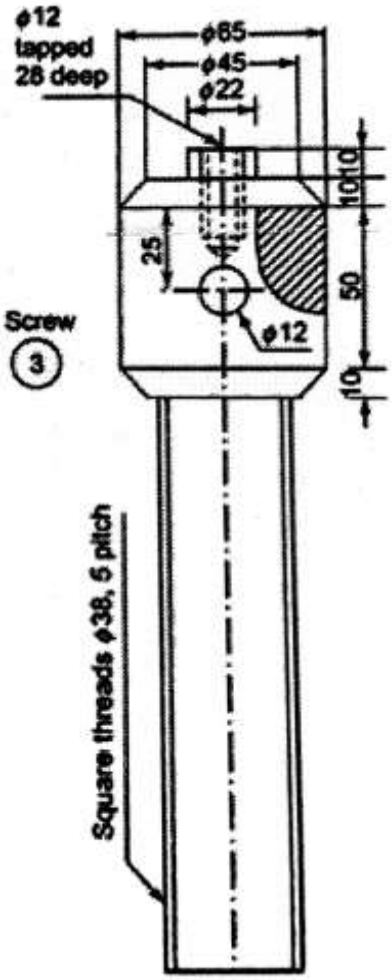


Figure 5. Question No. 10



Details of a screwjack