

Total No. of Printed Pages:5

**SUBJECT CODE NO: E-37**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech/Prod) Examination Nov/Dec 2017**  
**Theory of Machines-I**  
**(OLD)**

[Time: Four Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- N.B
- i) Q.1 & Q.6 are compulsory.
  - ii) Attempt any two questions from Remaining from each section.
  - iii) Assume suitable data, if required.

**Section A**

Q.1 Attempt any five questions.

10

- i) What is kinematics & dynamics?
- ii) Define higher pair with one example.
- iii) What is successfully constrained motion?
- iv) Calculate degree of freedom for four bar mechanism with all turning pairs?
- v) State Grashof's law for four bar mechanism.
- vi) State the Kennedy's Theorem of three instantaneous centres.
- vii) Sketch whitworth's quick return mechanism.
- viii) What is velocity image?
- ix) What is velocity of rubbing?
- x) What is acceleration image?

Q.2 The Mechanism of stone crusher is shown in figure 1. The length of various links in mm are – 15  
OA = 100, AB = 600, BC = 200, AC = 600, QB = 350 CD = 320, MD = 390, OK = 170, MK = 280.  
The cranks rotates at uniform velocity of 120rpm and is inclined at 30° to the horizontal. Draw velocity diagram & find

- i) Velocity of point K (Jaw)
- ii) Angular velocity of links ABC & MKD
- iii) Torque required at the Crank OA to overcome a horizontal force of 40KN at K.

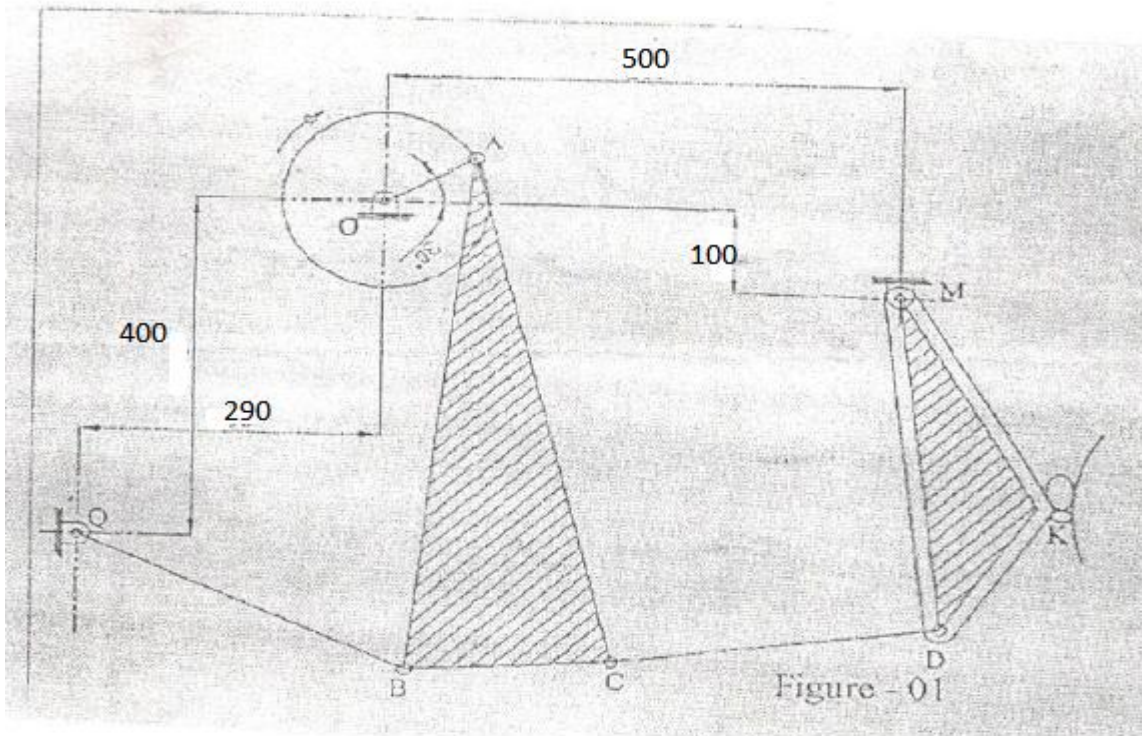


Figure - 01

Q.3 The length of various links of mechanism, as shown in figure 2 are :  $OA = 300\text{mm}$ ,  $AB = 1000\text{mm}$ ,  $CD = 800\text{mm}$ , and  $AC = CB$ . Determine, for the given configuration, the velocity of the Slider D if the crank OA rotates at 60 rpm in the clockwise direction. Also find the angular velocity of the link CD. Use instantaneous centre method. 15

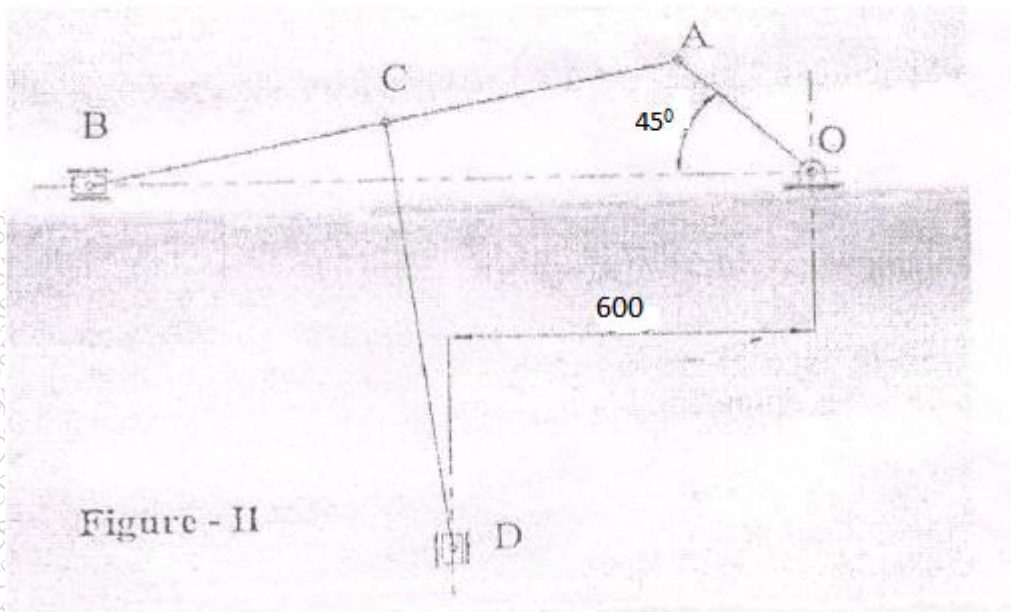
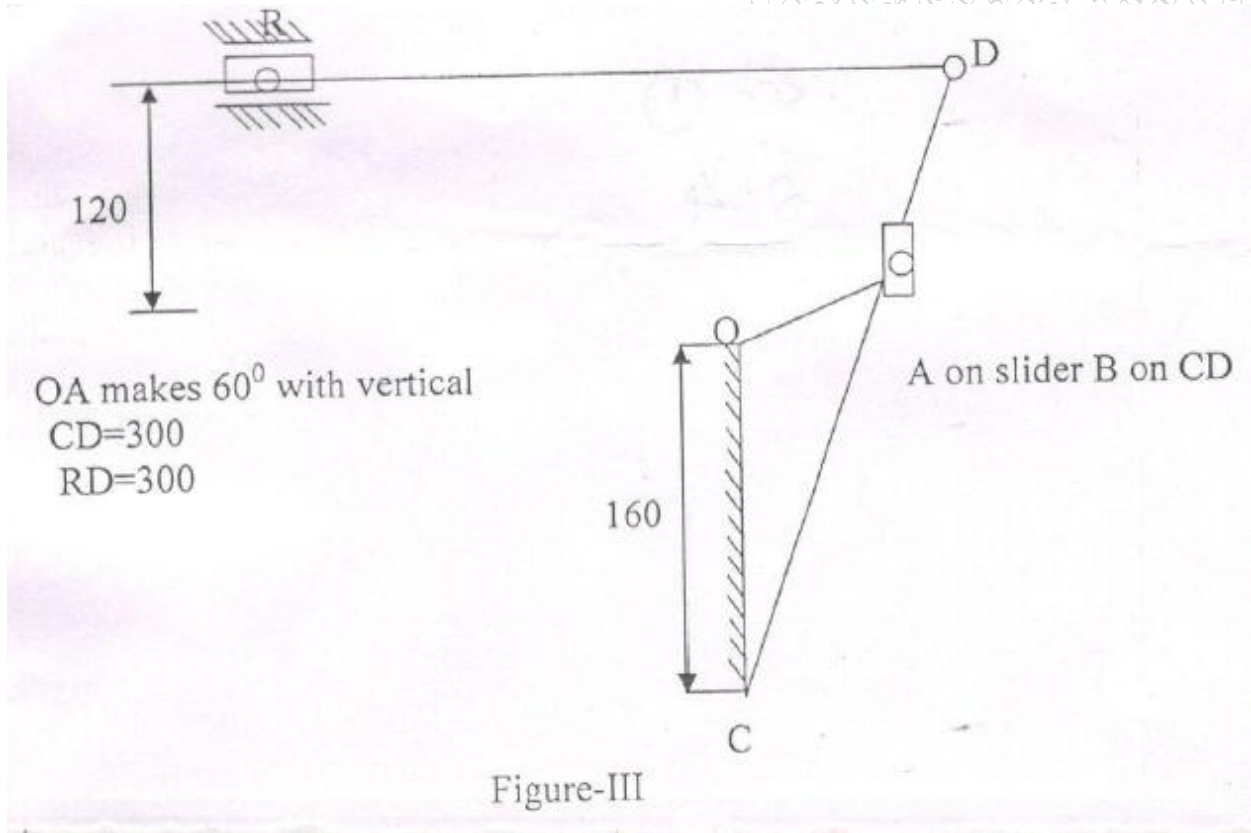
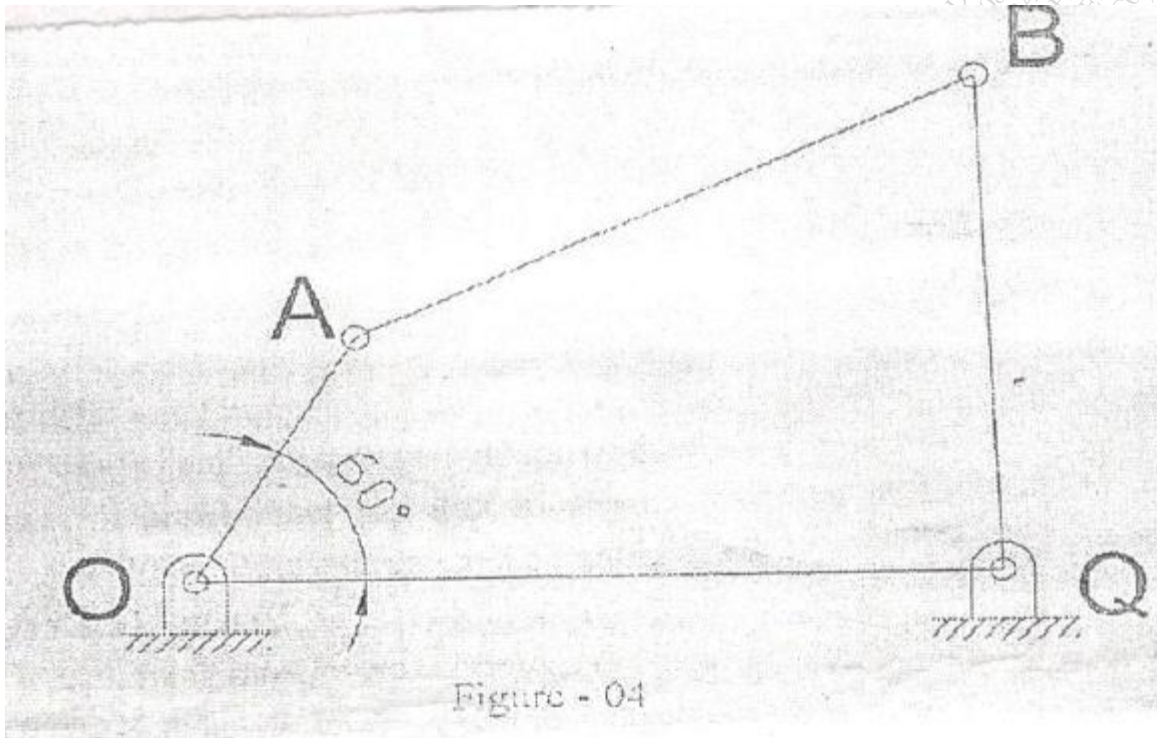


Figure - II

- Q.4 In a quick return mechanism as shown in figure 3, the driving crank OA is 60 mm long and rotates at 15 a uniform speed of 200 rpm. In a clockwise direction. For the position shown Find –
1. Velocity of Ram R
  2. Acceleration of ram R
  3. acceleration of the sliding block A along the slotted bar CD



- Q.5 a) A mechanism as shown in figure 4, length of various links are; OA = 40mm, AB = 85 mm, OQ = 100mm, BQ = 70mm. The link OA rotates with 300 rpm clockwise. The link OQ is fixed using modified Klein's construction method, Find –
- i) Velocity of point B
  - ii) Angular velocity of AB
  - iii) Acceleration of point B
  - iv) Angular acceleration of link AB



b) How are velocity and acceleration of slider of a single crank chain determined analytically? 07

### Section B

Q.6 Attempt any five questions. 10

- i) Sketch and label a cam profile.
- ii) Why radial follower is preferred to that of knife edge follower.
- iii) What is displacement diagram in cam?
- iv) Distinguish between brakes & dynamometers.
- v) Enumerate the types of brakes.
- vi) Draw neat sketch of internal expanding brake & labeled it.
- vii) Sketch & label epicyclic - train dynamometer.
- viii) Explain concept of balancing.
- ix) What do you mean by primary unbalancing?
- x) What is meant by static & dynamic unbalance?

Q.7 It is required to draw the profile of a cam to give following motion to the follower. 15

- i) Follower to move outwards through 31.4mm during  $180^\circ$  of cam rotation with cycloidal motion.
- ii) Follower to return with cycloidal motion during  $180^\circ$  of cam rotation.

Determine the maximum velocity and acceleration of the follower during the outstroke when the cam rotates at the 3000 rpm clockwise. The base circle of the cam is of 30mm radius & follower roller radius is 10mm. The axis of the follower is offset by 7.5mm to right.

- Q.8 A band and block brake having 12 blocks, each of which subtends an angle of  $16^\circ$  at the centre; is applied to a rotating drum with a diameter of 600mm. The blocks are 75mm thick. The drum and the flywheel mounted on the same shaft have a mass of 1800kg & have a combined radius of gyration of 600mm. The two ends of band are attached to pins on the opposite sides of the brake fulcrum at distance of 40mm & 150mm from it. If a force of 250N is applied on the lever at a distance of 900mm from the fulcrum find – 15
- Maximum braking torque
  - Angular retardation of the drum
  - Time taken by the system to be stationary from the rated speed of 300rpm.
- Q.9 A, B, C, D are the four masses carried by a rotating shaft at 100mm, 150mm, 150mm & 200mm radius respectively. The planes in which the masses rotate are spaced at 500mm apart and the magnitudes of the masses B, C and D are 9 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular setting of four masses so that shaft be in complete balance. 15
- Q.10 Each crank and the connecting rod of a four crank in – line engine are 200mm & 800mm respectively. The outer crank are set at  $120^\circ$  to each other and each has a reciprocating mass of 200kg. The spacing between adjacent planes of cranks are 400mm 600mm & 500mm. If the engine is in complete primary balance, Determine the reciprocating masses of the inner cranks and their relative angular positions. Also find the secondary unbalanced force if the engine speed is 210rpm. 15

Total No. of Printed Pages:2

**SUBJECT CODE NO:- E\_69**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech/Prod) Examination Nov/Dec 2017**  
**Thermodynamics-II**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- 1) Question No.1 and 6 are compulsory from each section A & B.
  - 2) Solve any two questions from remaining questions in each section A & B.
  - 3) Use of steam table, mollier diagram is permitted.
  - 4) Assume suitable data if required.

**Section A**

- Q.1 Solve any five 10
- i) Write four boiler accessories
  - ii) Differentiate between water tube boiler and fire tube boiler.
  - iii) State function of fusible plug.
  - iv) Classify draught.
  - v) Write applications of steam.
  - vi) Write functions of chimney
  - vii) Define nozzle efficiency.
- Q.2
- a) Explain 'La-Mont' boiler. 07
  - b) In a boiler test 1250 Kg of coal are consumed in 24 hours. The mass of water evaporated is 13000 kg and the mean effective pressure is 9 bars. The feed water temperature was 35°C, heating value of coal is 30 MJ/Kg; Determine i) Equivalent Evaporation ii) Efficiency of boiler. 08
- Q.3
- a) Derive the equation for height of chimney 07
  - b) In a chimney of height 50 meters temperature of all gases with natural draught is 350°C. The temperature of waste gases using artificial draught is 127°C. If air supplied is 19 kg/kg of fuel burnt, determine the efficiency of chimney. Assume,  $C_p=1.005$  KJ/Kg-K for fine gases. 08
- Q.4
- a) Explain effect of back pressure on nozzle characteristics. 07
  - b) Dry saturated steam at 10 bars is expanded isentropically in a nozzle to 0.2 bar using steam tables only; find the dryness fraction of steam at exit. Also find the velocity of stem leaving the nozzle When 1. Initial velocity is negligible and 2. Initial velocity of stem is 130 m/sec. 08

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- Q.5 Write short note on (Any three) 15
- Boiler efficiency
  - Isentropic flow through nozzle.
  - Mechanical draught.
  - Classification of boilers.

### Section – B

- Q.6 Solve any five 10
- What is cooling tower?
  - Define vacuum efficiency
  - Limitations of Carnot cycle.
  - Define swept, clearance and total volume of compressor.
  - Write any two applications of compressed air
  - Define compression ratio.
  - What is single acting and double acting compressor?
  - Write any two advantages of multistage compression.

- Q.7
- Derive the expression for the mass of circulating water required in condenser. 08
  - The vacuum at the extraction pipe in a condenser is 710 mm of Hg and the temp. is 36°C. The barometer reads 758 mm of Hg. The air leakage into the condenser is 4 kg per 10,000 kg of steam. Determine (1) the volume of air to be dealt with by the dry air pump per kg of steam entering condenser and (2) the mass of water vapor associated with this air. 07  
Take  $R=287 \text{ J/kg-K}$  for air.

- Q.8
- Explain modified Rankine cycle. 05
  - A steam engine admits steam at a pressure of 6.6 bar and 0.9 dry. The cut-off occurs at one-half stroke and pressure at release is 2.6 bars. The back pressure is 1bar. Find the modified Rankine efficiency of the engine, assuming the pressure drop at release to take place at constant volume. Neglect clearance volume. 10

- Q.9
- Explain with neat diagram centrifugal compressor. 06
  - Estimate the work done by a two stage reciprocating single acting air compressor to compress  $3\text{m}^3$  of air per minute at 1.05 bars and 12°C to a final pressure of 38 bars. The intermediate receiver cools the air at 30°C and 5.6 bar pressure. For air, take  $n=1.4$ . 09

- Q.10 Write short note on (Any three) 15
- Air Motor
  - Vacuum Pump
  - Compare reciprocating & rotary compressor
  - Evaporative condenser.

Total No. of Printed Pages:2

**SUBJECT CODE NO:E-101**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech/Prod) Examination Nov/Dec 2017**  
**Electrical Machine & Applied Electronics**  
**(OLD)**

**[Time: Three Hours]**

**[Max.Marks:80]**

Please check whether you have got the right question paper.

- N.B
- i. Q. No.1 form section A and Q. No.6 from section B are compulsory.
  - ii. Solve any two questions from remaining in each section.

**Section A**

- Q.1 Attempt any five 10
- a) Explain the working principle of DC motors
  - b) What is slip?
  - c) What are the applications stepper motor?
  - d) What is regenerative braking?
  - e) Draw the construction of universal motor.
  - f) Enlist the speed control method of 3-phase induction motor.
  - g) Define back EMF & state its significance.
  - h) How cooling of DC motor is carried out?
- Q.2
- a) Give the comparison between electric and mechanical drives 07
  - b) Explain the multi motor drive system with suitable example. 08
- Q.3
- a) Explain the selection criteria's for electric drive in cement industries. 07
  - b) Write a short note on cooling and heating of electric motors 08
- Q.4
- a) Draw and explain 3-points states for DC motors 07
  - b) Draw and explain the construction of squirrel cage motor. 08
- Q.5 Write short notes on any three. 15
- a) DC servomotors
  - b) Slip power recovery scheme.
  - c) Stepper motor
  - d) Application of electric drive for steel mill.

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Section B

- Q.6 Attempt in **five** 10
- a) What is SCR?
  - b) Compare 7-segment display an LCD display.
  - c) Why sequential timer circuit is used.
  - d) Give detail classification of sensor.
  - e) What is see-back effect?
  - f) What is need of buzzer and alarms?
  - g) Draw the symbol of SCR, TRIAC, MOSFET
  - h) What is relay? What are it types?
- Q.7 a) Give the details classification of actuators. 07
- b) Explain in details working principle of Transistor. 08
- Q.8 a) Explain in details 7 segment display 07
- b) What is heat sink & explain causes and effect of heat sink 08
- Q.9 a) Explain temperature controller 07
- b) What are the types of load cells? Explain construction & working 08
- Q.10 Write a shorts notes on any **three** 15
- a) Proximity switch
  - b) Opt coupler
  - c) LCD display
  - d) MOSFET

Total No. of Printed Pages:2

**SUBJECT CODE NO:- E – 170**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech/Prod) Examination Nov/Dec 2017**  
**Production Processes-II**  
**(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 questions 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 are the various materials used for Cutting Tools in machining process?
  - b) What is chip breaker?
  - c) What is Mechanization?
  - d) What is/are the functions of cutting fluids?
  - e) Define cutting speed and feed rate.
  - f) Enlist Lathe Attachments.
  - g) What are the types of Lathe Machines?
  - h) What are the applications of universal dividing head?
  - i) What are the various types of Milling Machines?
  - j) Enlist milling cutters.
- Q.2 a) What are the various types of cutting tools used in machine tools? 08  
b) What are the various types of chips generated during machining? 07
- Q.3 a) Explain orthogonal and oblique cutting. 08  
b) What are the various operations performed on Lathe Machine? 07
- Q.4 a) What are the various Lathe Accessories used during machining? 08  
b) Explain the Principle and working of Universal Milling Machine. 07
- Q.5 a) With neat sketch explain gear hobbing. 08  
b) What are the various workpiece holding devices use in milling machines? 07

**Section B**

- Q.6 Attempt any five questions from the following:- 10
- a) What are the various types of shapes?
  - b) What are the types of wheels in grinding process?
  - c) What are the functions of broach tool?
  - d) What is grit and grade in grinding process?
  - e) What is the need of non traditional machining?
  - f) What are the functions of slotter?
  - g) Enlist work holding devices for drilling process.
  - h) What are boring bars?
  - i) What are the applications of Laser Beam Machining process?
  - j) What is ultrasonic machining?
- Q.7 a) How dressing and truing of grinding wheel done? 08  
b) Explain the principle and working of Shaper Machine. 07
- Q.8 a) With neat sketch and applications explain Jig Boring Machine. 08  
b) What are the various types of surface grinders? Explain any one with neat sketch. 07
- Q.9 a) Explain Push and Pull type of broach. 08  
b) What is Abrasive Jet Machining? Explain with neat sketch giving examples. 07
- Q.10 a) Explain EDM process. Give its applications. 08  
b) With neat sketch explain Electro Chemical Grinding. 07

Total No. of Printed Pages:5

**SUBJECT CODE NO: E-225**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(MECH/PROD) Examination Nov/Dec 2017**  
**Machine Drawing**  
**(OLD)**

[Time: 4 Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- 1) All the question are compulsory
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if & wherever necessary

**Section A**

Q.1 a) A cylinder of base Diameter 50mm and height 75mm is kept on H.P with it's axis vertical 08  
A square hole of side 30mm is drilled through it the axis of which is perpendicular to V.P  
parallel to H.P and 10mm to the right of the axis of the cylinder Axis of Hole is at center  
height and all the faces of the hole are equally inclined to H.P draw the development of  
lateral surface of cylinder.

b) A semicircle with radius 80mm represent the development of lateral surface of a cone. A 08  
square of largest size is inscribed in the semicircle draw front view and top view of cone &  
project the square on them.

Q.2 A vertical square prism base 60mm side and axis height 105mm has a rear rectangular faces 12  
inclined at  $30^\circ$  to V.P it is completely penetrated by horizontal square prism of 45mm edge  
of base and 105mm long, faces of which are equally inclined to H.P axis of two prisms are  
parallel to V.P and bisect each other at right angles. Draw projections of solids

OR

A cone diameter of base 80mm and height 90mm is resting on H.P on it's base a hole of 12  
50mm diameter is drilled through the cone the axis of the Hole is 28mm above and parallel  
to the base of cone. the axis of the Hole is parallel to the V.P also draw three views of cone  
showing lines of intersections of Hole with cone.

Q.3 Fig .1 show partial Auxiliary view & incomplete T.V of an object complete the top view and also 12  
draw left hand side view.

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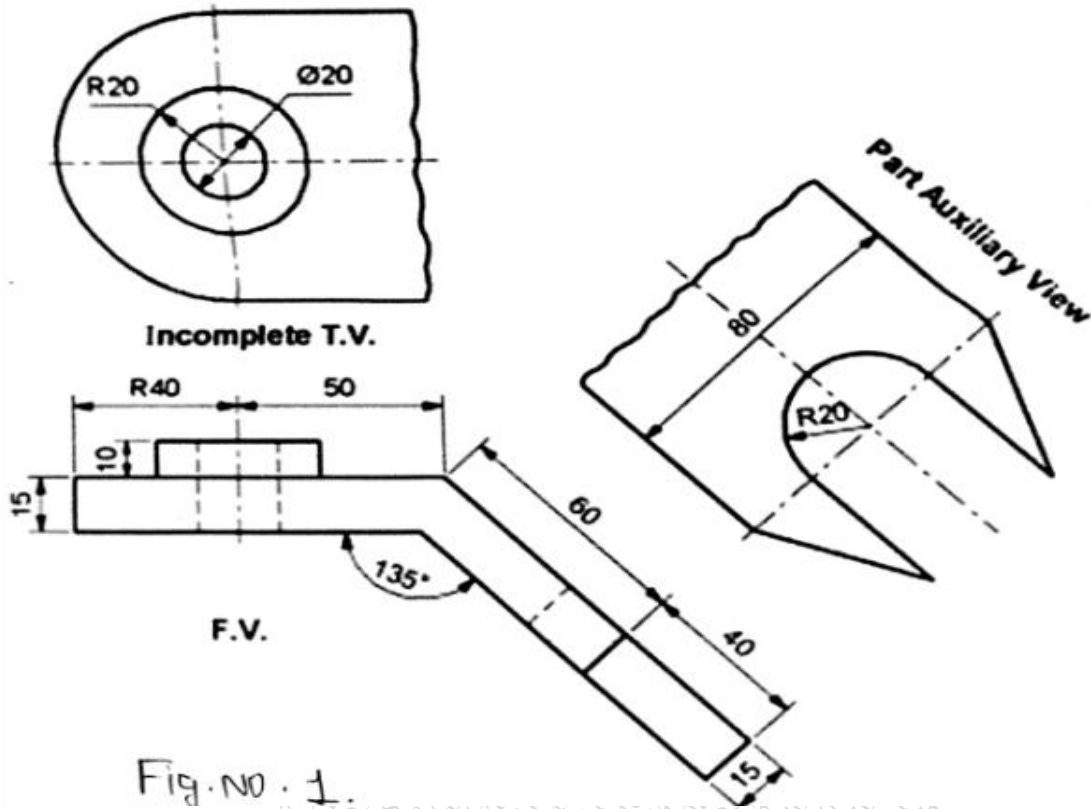


Fig. NO. 1.

OR

Fig No.- 2 show front view incomplete top view and partial auxiliary view of an object draw the followings view

- i) Front view
- ii) Right hand side view
- iii) Complete top view

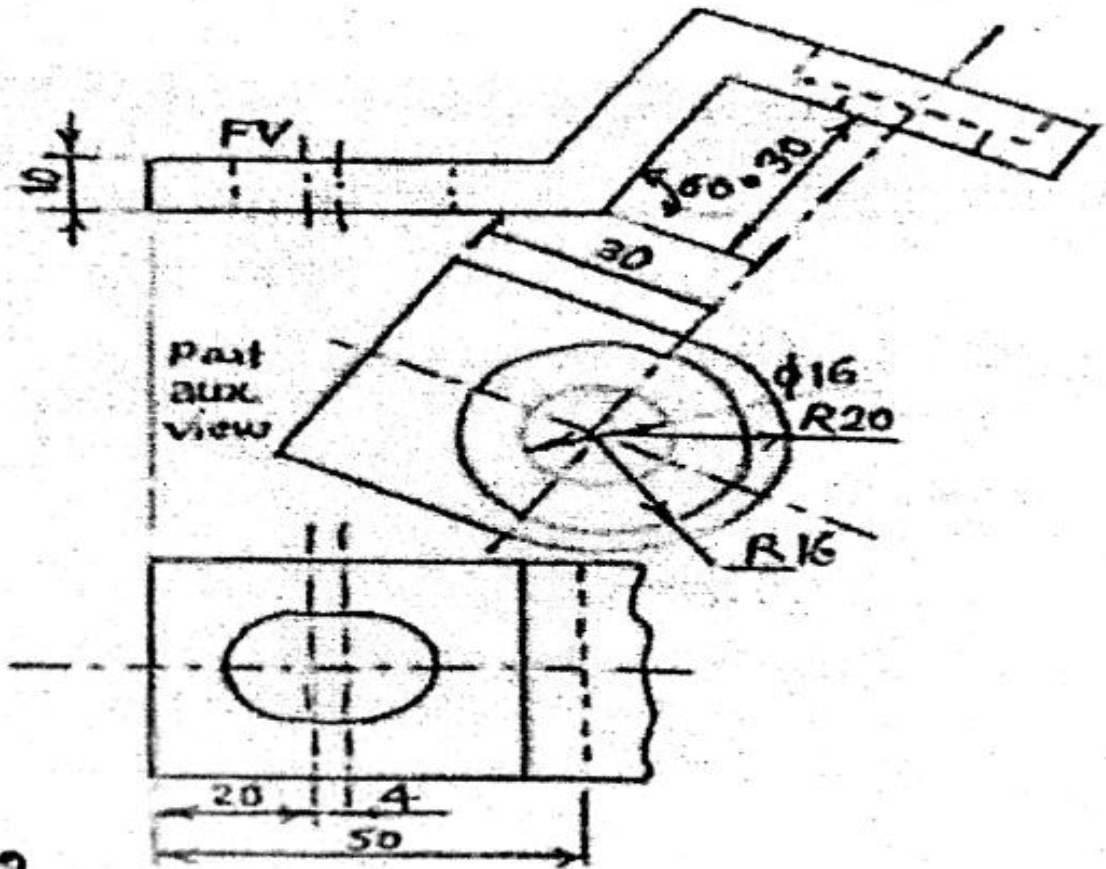


Fig. 02

Section – B

Q.4 Draw the conventional representation for the following

15

- 1) Square thread
- 2) Position of weld
- 3) Worm wheel
- 4) Roughness grade N10
- 5) Bearing
- 6) Double U – Butt weld
- 7) External screw thread
- 8) Plug weld
- 9) Lap joint
- 10) Knuckle thread
- 11) Cross pipe joint
- 12) Machining symbol indicate removal of material is not permitted
- 13) Packing & insulating material
- 14) Nipple pipe joint
- 15) Surface texture obtained without removal of material

Q.5 Fig No.3 show the details of machine vice. Draw sectional F.V & T.V of an assembly. also prepare 25 bill of material.

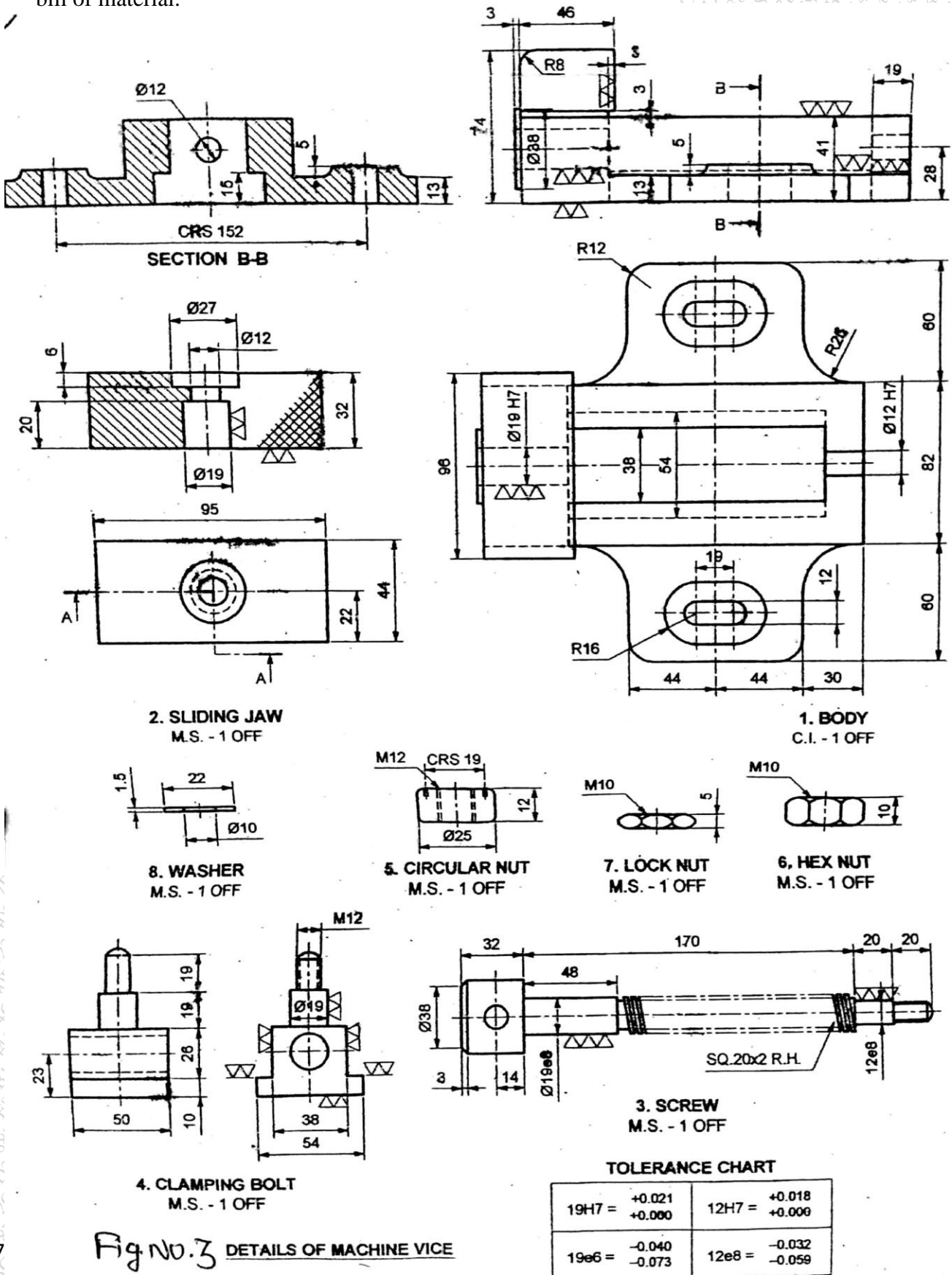
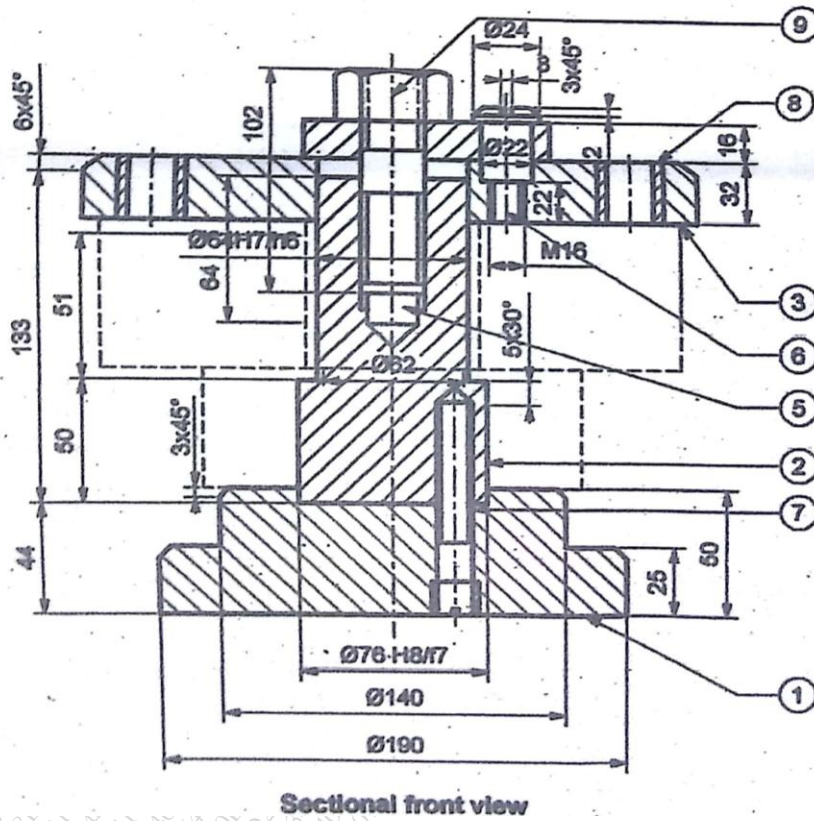
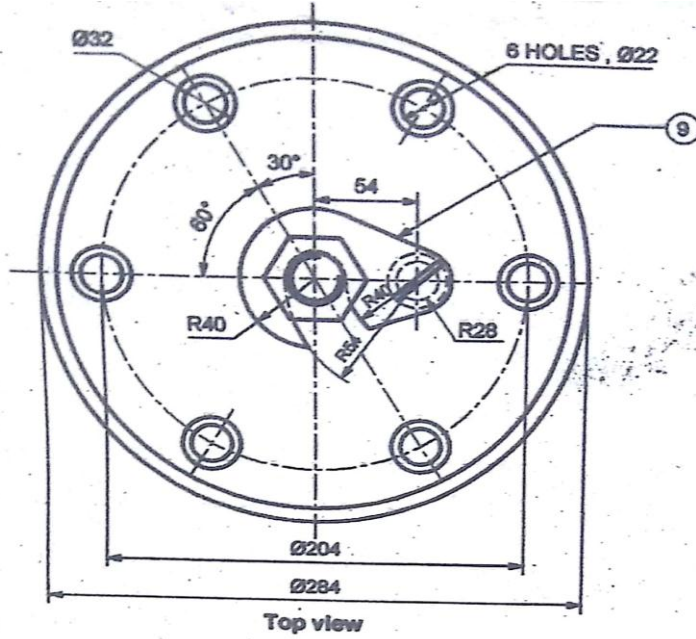


Fig No.3 DETAILS OF MACHINE VICE

OR

Q.5 Fig. no 4 show assembly of Drill jig draw details

25



Bill of material

P.No	Part name	MELT	QTY.
1	Base Plate	C.I	1
2		M.S	1
3	Locating jig	C.I	1
4	Latch washer	M.S	1
5	Stud	M.S	1
6	Pin	M.S	1
7	Cap screw	M.S	3
8	Bush	C.S	6
9	Nut	M.S	1

Fig .4 assembly of drilling jig



**SUBJECT CODE NO: E-226**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mechanical) (CGPA) Examination Nov/Dec 2017**  
**Machine Drawing**  
**(REVISED)**

[Time: Three 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 cone 70 mm base diameter and 90mm axis is completely penetrated by a square prism from top with its axis parallel to cone axis and 5 mm away from it. A vertical plane containing both axes in parallel to V.P. take all faces of 89. Prism equally inclined to V.P. Base side of prism is 30mm and axis is 100mm long. Draw projections showing curves of intersection. 14
- Q.2 Draw the semicircle of 100mm dia and inscribe in it a largest circle of the semicircle in development of a 13 cone and inscribed circle is some curve on it, then draw the projection of cone showing that curve. 13

OR

Elevation of the three-pieces 'A', 'B' & 'C' cylindrical elbow pipe is given in fig 1 draw the development of all pieces. 13

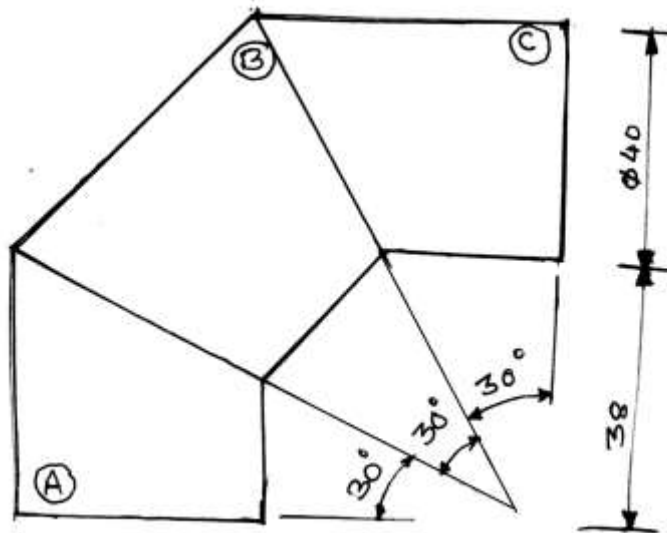


Fig.1

Q.3 Fig 2 shows front view, incomplete top view and auxiliary view of an object. Redraw the front view and complete the top view. 13

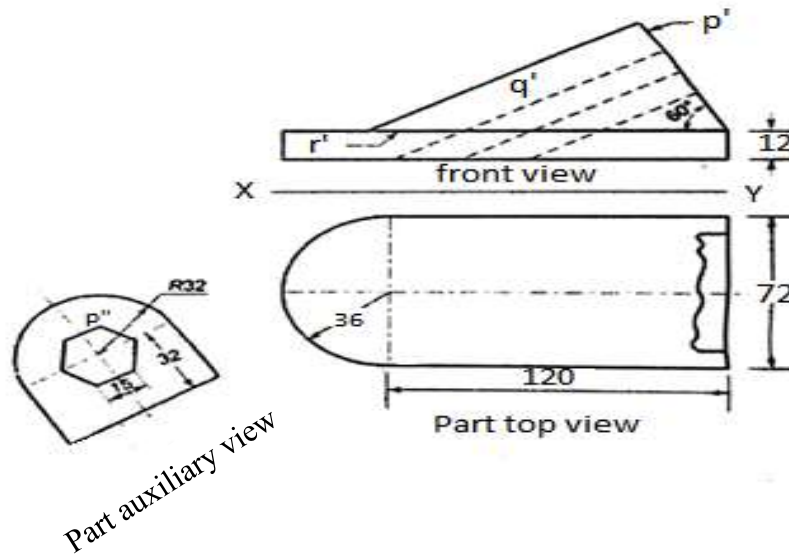
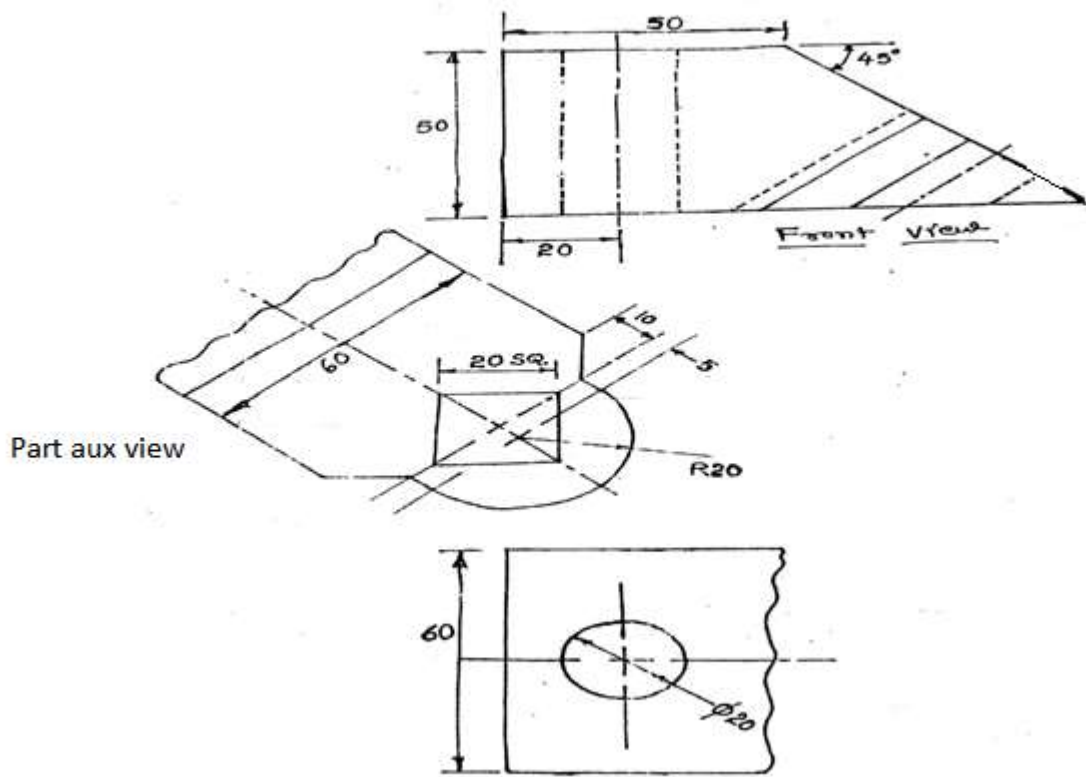


Fig.2

**OR**

Fig.3 shows front view, in complete top view and auxiliary view of an object. Redraw the front view and complete the top view. 13



Incomplete top view  
Fig.3

**Section B**

Q.4 Solve any five question from the following :

- Draw the material conversions of :
  - Rubber
  - Wood
  - Copper and its alloys
- Eye foundation bolt
- Socket and spigot pipe joint
- Single riveted double strap butt joint
- Give the symbols of following welded joints
  - Square butt joint
  - Spot welding
  - Fillet joint
- Give surface roughness values and symbol for:
  - N3
  - N7
  - N11

Q.5 Figure 4 shows details of the screw jack. Assemble all the parts, tabulate the bill of material and draw; 25

- i) Sectional front view
- ii) Top view

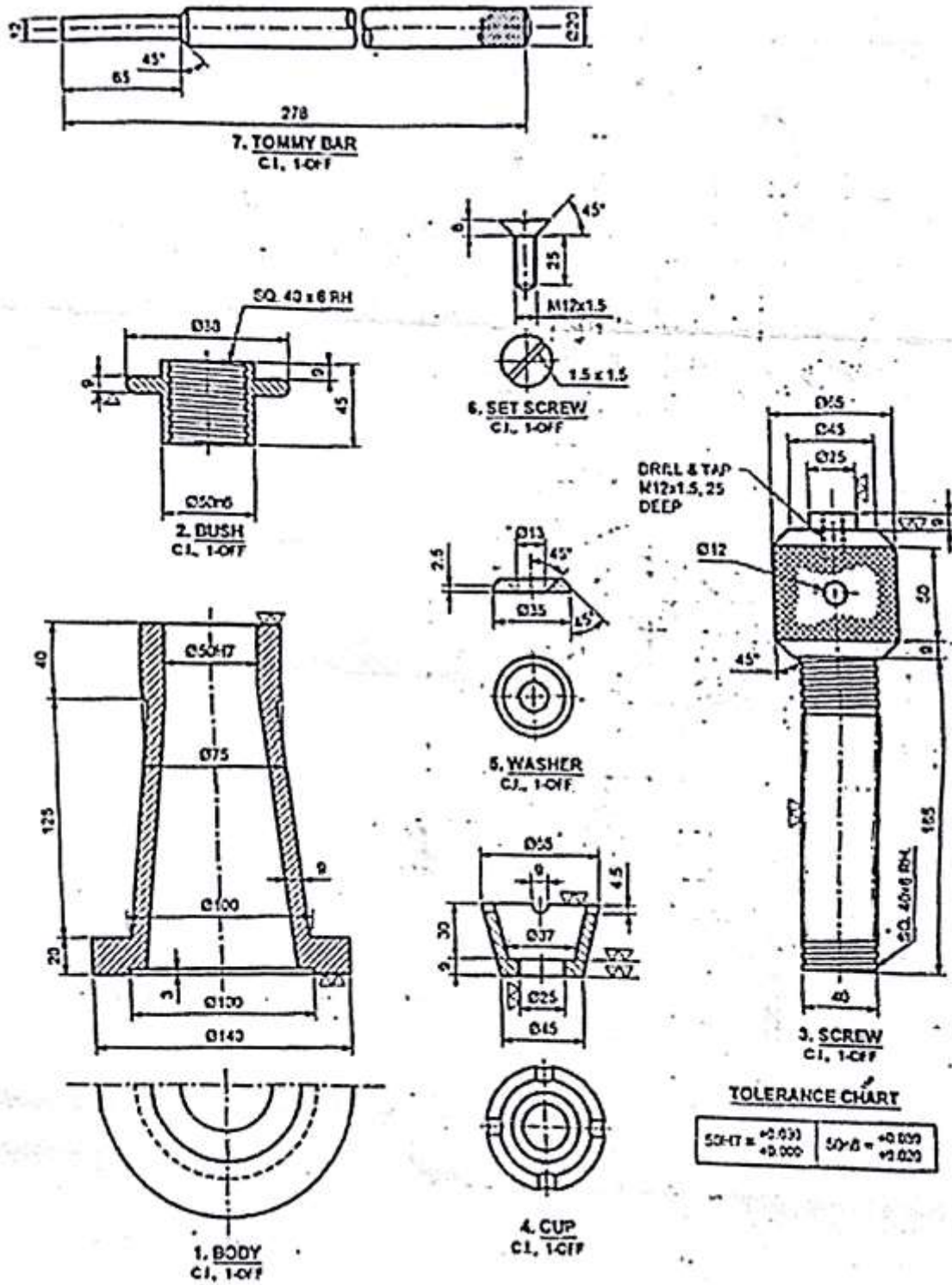


Fig.4

OR

Figure 5 shows assembly of petrol engine piston and connecting rod along with part list. Draw the details 25 in front view and side view.

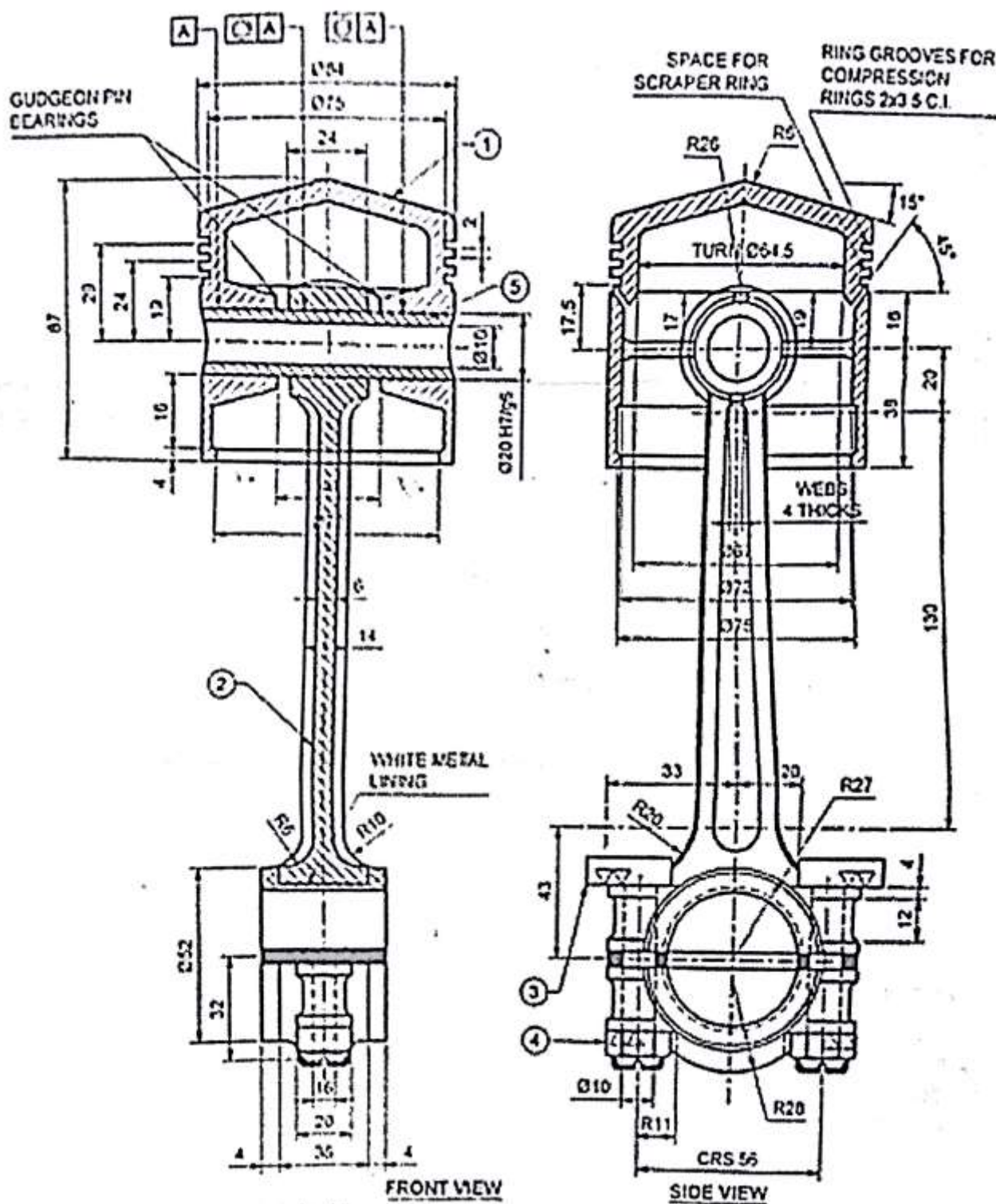


Fig.5

**PART LIST**

<b>PART NO.</b>	<b>PART NAME</b>	<b>MATL</b>	<b>QTY.</b>
1	PISTON	ALLOYALLOY	1
2	CONNECTING ROD	ALLOY STEEL	1
3	BIG-END BOLT	M.S.	2
4	CASTLE NUT	M.S.	2
5	GUDGEON PIN	HARDENED STEEL	1

**FIT CHART**

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Total No. of Printed Pages:02

**SUBJECT CODE NO:- E-264**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(MECH/PROD) Examination Nov/Dec 2017**  
**Thermodynamics-I**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

- N.B
- Please check whether you have got the right question paper.
- i) Q.No.1 and Q.No.6 are compulsory.
  - ii) Solve any two questions from remaining questions in each section.
  - iii) Use of steam table / mollier diagram is allowed.
  - iv) Assume suitable data, if required.
  - v) Figure to the right indicates full marks.

**Section-A**

- Q.1 Solve any five 10
- a) What is PMM-1 ?
  - b) Define heat Engine and heat pump.
  - c) Derive an equation for steam nozzle from S.F.E.E.
  - d) State “Kelvin-Plank” statement of II<sup>nd</sup> Law of thermodynamics.
  - e) What do you mean by available energy?
  - f) What is Temperature-Entropy diagram?
  - g) Find the Co-efficient of performance and heat transfer rate in the condenser of a refrigerator in KJ/hr which has a refrigeration capacity of 12000 KJ/hr when power input is 0.75 kw.
- Q.2
- a) Steam enters a turbine with a velocity of 40 m/s and specific enthalpy of 2500 KJ/Kg. and leaves with a velocity of 90 m/s and specific enthalpy of 2030 KJ/Kg. Heat losses from the turbine to surroundings are 240 KJ/min and the steam flow rate is 5040 Kg/hr. Neglect the change of potential energy. Find the power developed by turbine. 09
  - b) Write down general energy equation for steady flow system and simplify when applied for the following system : 06
    - i) Reciprocating compressor,
    - ii) Steam or Gas turbine
- Q.3
- a) A refrigerator operates on reversed Carnot cycle whose C.O.P is 5. The evaporator is maintained at a temperature of  $-6^{\circ}\text{C}$  and power required to run the refrigerator is 3.5 KW. Determine the refrigerating effect and condenser temperature of the refrigerator. 09
  - b) Prove the equivalence of Kelvin Plank and Clausius statements of second law of thermodynamics. 06
- Q.4
- a) State and explain Clausius theorem 08
  - b) Explain the terms dead state, useful work and maximum work. 07

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- Q.5 Write short note (any three) 15
- Flow process and control volume.
  - Carnot Theorem
  - Entropy-a property of a system
  - Performance of heat engines and reversed heat engines.

Section-B

- Q.6 Solve any five 10
- Draw Brayton cycle on P-V and T-S Diagram.
  - State any three assumptions of air standard cycle.
  - The efficiency of an Otto cycle is 60% and the ratio of specific heat is 1.5. What is the compression ratio?
  - Define wet steam and superheated steam.
  - Define pure substance. State its examples.
  - Define fuel. State its types.
  - What is calorific value? State its types.

- Q.7 a) The stroke and cylinder diameter of a compression ignition engine are 245 mm and 145 mm respectively. If clearance volume is  $0.0004 \text{ m}^3$  and fuel injection takes place at constant pressure for 5% of the stroke, determine the efficiency of the engine. Assume the engine working on Diesel cycle 08

- b) Derive an expression for mean effective pressure of Otto cycle. 07

- Q.8 a) With neat sketch explain the construction and working of throttling calorimeter. 06

- b) Calculate the internal energy per kg of superheated steam at a pressure of 10 bar and a temperature of  $300^\circ\text{C}$ . Also find the change of internal energy if this stream is expanded to 1.4 bar and dryness fraction 0.8. 09

- Q.9 a) Write a short note on Bomb calorimeter. 08

- b) Explain flue gas analysis by using Orsat apparatus. 07

- Q.10 Write short note (any three): 15

- Atkinson cycle
- Triple point
- Solid fuels
- Mollier diagram



Total No. of Printed Pages:2

**SUBJECT CODE NO:- E-265**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech) (CGPA) Examination Nov/Dec 2017**  
**Thermodynamics-I**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.no.1 & Q.no.6 from section A & B are compulsory
  - 2) Solve any two question from each section A & B
  - 3) Use of steam table & mollier diagram allowed
  - 4) Assume suitable data if required

**Section A**

- Q.1 Solve any five 10
- i) Explain flow work
  - ii) Explain control volume
  - iii) Modify SFEE for isentropic turbine
  - iv) State Carnot theorem
  - v) Explain PMM-I
  - vi) Define Available energy
  - vii) Differentiate between steady flow and non flow process
- Q.2 07
- a) Explain Heat engine refrigerator and Heat Pump
  - b) 12kg per minute of air is delivered by compressor. The inlet and outlet conditions of air are  $C_1=12\text{m/s}$ ,  $P_1= 1\text{bar}$  and  $C_2= 90\text{m/s}$   $P_2=8\text{ bar}$  . The increase in enthalpy of air passing through compressor is 150 kJ/kg and heat loss to surroundings is 700KJ/min find power required to drive the compressor
- Q.3 06
- a) Discuss limitations of first law of thermodynamics
  - b) A cyclic heat engine operates between a source temperature of 1000°C and sink temperature of 50°C find least rate of heat rejection per KW net output of the engine
- Q.4 07
- a) Explain entropy & irreversibility
  - b) Explain principle of increase in entropy of universe
- Q.5 15
- Write short note on ( any three)
- i) PMM-II
  - ii) Thermodynamics temp. scale
  - iii) Clausius theorem
  - iv) Availability in steady flow and non- flow processes

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Section-B

- Q.6 Solve any five 10
- i) Explain pure substance
  - ii) Write assumptions in power cycles
  - iii) Define triple point
  - iv) Define HCV and n LCV
  - v) Draw PV and T-S diagram of Brayton cycle
  - vi) Explain mean effective pressure
  - vii) Explain critical point
- Q.7
- a) Explain phase change diagram of pure substance 06
  - b) The minimum pressure and temp. in an otto cycle are 100KPa and 27°C the amount of heat added is 1500 KJ/KG. calculate pressure & temp. at all point assuming compression ratio= 8 09
- Q.8
- a) Explain steps to convert volumetric analysis to mass analysis and vice versa 06
  - b) A vessel having capacity of 0.05m<sup>3</sup> contains mixture of saturated water & Saturated steam at 245°C the mass of liquid presents is 10Kg find the followings 09
    - a) Pressure (b) the mass
    - b) Specific volume (d) specific enthalpy (e) sp. entropy
- Q.9 % composition of liquid fuel is C=85% and H<sub>2</sub>=15% by mass calculate 15
- 1) Mass of air required per kg of fuel
  - 2) Product of combustion by volume is 15% excess air is supplied
- Q.10 Short note on ( any three) 15
- i) Orsat apparatus
  - ii) Ericsson cycle
  - iii) Throttling calorimeter
  - iv) Carnot cycle

Total No. of Printed Pages:2

**SUBJECT CODE NO:- E-305**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech/Prod) Examination Nov/Dec 2017**  
**Production Processes-I**  
**(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. Attempt any two questions from Q.No.2 to Q.No.5 in section A and any two questions 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 <u>any five</u> questions from the following.  | 10       |
|     | <ol style="list-style-type: none"><li>a) What are the materials used in the pattern?</li><li>b) What are the types of sand and sand additives?</li><li>c) What is meant by the term 'Reserving'?</li><li>d) List the different types of furnaces used in melting of metals.</li><li>e) Name the different hot working and cold working processes.</li><li>f) Define Impact Extrusion.</li><li>g) State the applications of cold extrusion</li><li>h) What is press tool?</li><li>i) What are the types of bending?</li><li>j) Explain slitting and lancing</li></ol> |          |
| Q.2 | <ol style="list-style-type: none"><li>a) What are the common allowances provided on pattern? Explain.</li><li>b) What is core? Explain types of core?</li></ol>  | 07<br>08 |
| Q.3 | <ol style="list-style-type: none"><li>a) Explain continuous casting processes with neat sketch?</li><li>b) Explain tilting furnace.</li></ol>  | 07<br>08 |
| Q.4 | <ol style="list-style-type: none"><li>a) What are the various hot working processes? Explain the process used for manufacturing of seamless pipes.</li><li>b) What is forging? Explain the defects of forging.</li></ol>   | 08<br>07 |
| Q.5 | <ol style="list-style-type: none"><li>a) What is Die? Explain any two types of dies.</li><li>b) Explain the following sheet metal processes.<ol style="list-style-type: none"><li>i) Blanking</li><li>ii) Nibbling</li><li>iii) Notching</li><li>iv) Piercing</li></ol></li></ol>  | 07<br>08 |

2017

**Section B**

- Q.6 Solve any five questions from the following. 10
- a) What is plastics?
  - b) What are the various types of plastic Moulding Dies?
  - c) What is the function of filler metals?
  - d) What is the purpose of surface treatment?
  - e) Explain flux and its functions.
  - f) How flame is adjusted in gas welding?
  - g) Why cylinders are kept in upright position during welding?
  - h) What is anodizing?
  - i) What are the functions of the shielding gases?
  - j) Enlist safety equipment's for welding process.
- Q.7 08
- a) What is injection moulding? Give its applications.
  - b) With neat sketch explain transfer molding. 07
- Q.8 08
- a) What is oxy-Acetylene welding? Give its advantages and limitations.
  - b) Explain submerged Arc welding with its applications. 07
- Q.9 08
- a) What is friction welding? Give its applications.
  - b) What are the various weld defects? What remedial action to be taken to overcome the defects? 07
- Q.10 08
- a) Explain mechanical cleaning method for surface of metals.
  - b) What are the types of coatings? Explain any one 07

Total No. of Printed Pages:2

**SUBJECT CODE NO:- E-306**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech) (CGPA) Examination Nov/Dec 2017**  
**Production Processes**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Solve any two from questions 1, 2, 3, & 6, 7, 8.
  - 2) Solve any one from questions 4, 5, & 9, 10.

**Section A**

- |     |  |    |
|-----|--|----|
| Q.1 | a) What are different types of patterns? Explain any four types.                                 | 07 |
|     | b) Discuss about preparation of Green Sand mould with suitable sketch.                           | 07 |
| Q.2 | a) How Hot Chamber Die Casting is prepared & where it is suitable over Cold Chamber Die Casting. | 07 |
|     | b) Differentiate between Hot Working & Cold Working of Metals                                    | 07 |
| Q.3 | a) Explain with applications about Extrusion & Drawing operations.                               | 07 |
|     | b) How following sheet metal operations can be done?   | 07 |
|     | i) Blanking  |    |
|     | ii) Punching   |    |
|     | iii) Piercing  |    |
|     | iv) Lancing  |    |
| Q.4 | a) Which properties moulding sand should possess? Explain briefly.                               | 06 |
|     | b) Explain zones in cupola furnace with neat sketch.   | 06 |
| Q.5 | a) Write a short note on Rotary Swaging  | 06 |
|     | b) What are shearing & bending operations?   | 06 |

## Section B

- Q.6 a) Explain different flames used in the Gas Welding. 07  
b) What are resistance welding methods & their applications? 07
- Q.7 a) How Thermit Welding is used in joining? 07  
b) Explain the method of manufacturing water bottles in detail. 07
- Q.8 a) With neat sketch describe Injection Moulding. 07  
b) Elaborate mechanical & chemical cleaning methods for surface of metals. 07
- Q.9 a) Justify role of plasma arc welding & how it is performed? 06  
b) Differentiate between A.C & D.C power sources used in Arc Welding. 06
- Q.10 Write short note on any three 12  
i) Electroplating  
ii) Galvanizing  
iii) Anodizing  
iv) Metal spraying

# Subject Code : 349

FACULTY OF ENGINEERING & TECHNOLOGY

S.E. (Mech./Prod.) Examination

NOVEMBER/DECEMBER, 2017

## Strength of Materials

Time: Three Hours

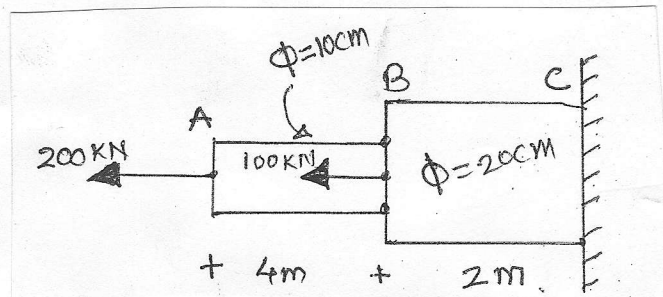
Max. Marks: 80

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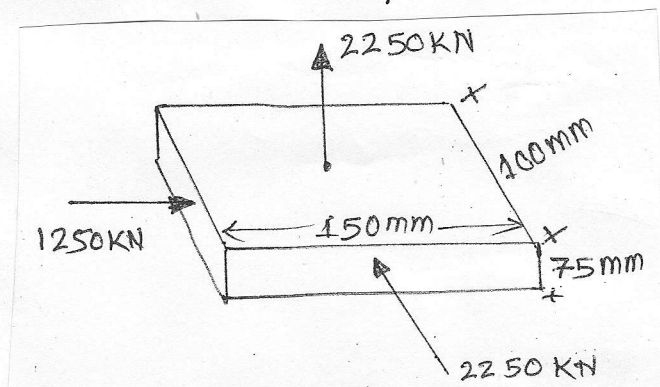
- Note:
- Question No. 1 & 6 are compulsory.
  - Attempt any Two from remaining for each section.
  - Figures to the right indicate full marks.
  - Assume suitable data if necessary.

### SECTION – A

- Q.1 Attempt any Five : 10
- Define Hogging bending moment.
  - State and explain Hooke's law.
  - Define shear stress.
  - Define bending stress.
  - Define modulus of rigidity.
  - Define thermal stress.
  - Draw shear stress diagram for rectangular section.
- Q.2 (a) Determine the total extension of rod loaded as shown in figure. 07



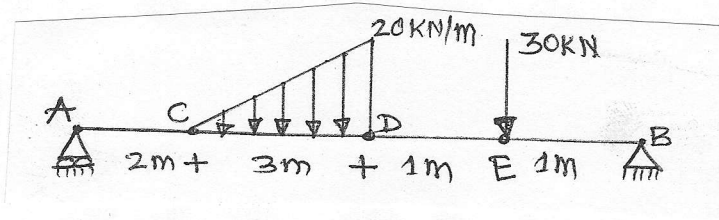
- (b) A metallic piece is subjected to forces as shown in Figure. Determine change in dimension if  $E=200\text{ GPa}$  &  $\mu = 0.25$ . 08



# Subject Code : 349

-2-

- Q.3 (a) Define shear force and bending moment. 03  
 (b) A simply supported beam subjected to a load as shown in figure. Draw S.F.D., B.M.D & all significant points of exists. 12



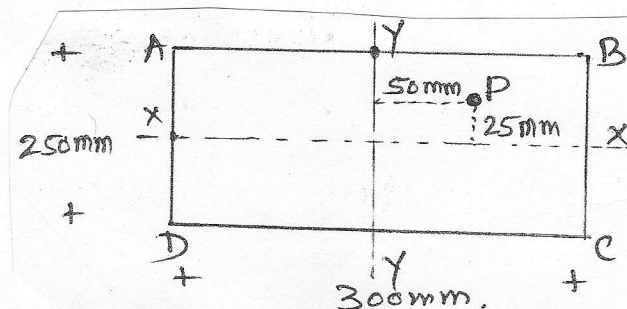
- Q.4 (a) Prove that : 08

$$\frac{M}{I} = \frac{E}{Y} = \frac{E}{R}$$

- (b) A rectangular beam 300mm wide and 200mm deep is simply supported of a span of 8m. What u.d.l. per metre the beam may carry, if the bending stress is not to exceed 120 N/mm<sup>2</sup>. 07
- Q.5 (a) A beam of channel 120mm x 60mm has uniform thickness of 15mm. Draw diagram showing the distribution of shear stress for a vertical section where shearing force is 60 kN. Find the ration between maximum and mean shear stress. 08  
 (b) Draw stress strain diagram for ductile material and explain in detail. 07

### SECTION - B

- Q.6 Attempt any Five : 10
- (a) Define slope and deflection.  
 (b) Define Mohr's circle method.  
 (c) Explain Hoop stress.  
 (d) Define angle of obliquity.  
 (e) State general equation of slope and deflection of beam.  
 (f) Define proof resilience.  
 (g) Define principal stress.
- Q.7 (a) A rectangular column 300mm x 250mm is subjected to a compressive load of 400 kN at a point 'P' as shown in figure. Find stresses at all the four corners of columns. 09



E - 2017

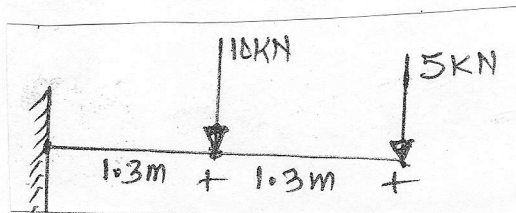
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# Subject Code : 349

-3-

- Q.7 (b) A hollow steel shaft 240mm external and 160mm internal diameter is to be replaced by solid alloy shaft. If both the shaft have same polar modulus. Find the diameter and ratio of torsional rigidity.  
Take :  $G_{\text{HOLLOW}} = 2.35 G_{\text{Solid}}$  06
- Q.8 (a) A hollow circular shaft of external diameter of 150mm and internal diameter 110mm. The maximum permissible shear stress is 100 mpa and twist is not exceed  $3.6^\circ$  in length of 3m. If maximum torque is 25% more than average torque and shaft rotating at 2 R.P.S. Find safe power that can be transmitted. Take  $G = 80 \text{ GPa}$ . 10
- (b) Derive the equation for strain energy stored in a body due to shear stress. 05
- Q.9 (a) At a point in an elastic material under strain, there are normal stress of 50MPa and 30 MPa compressive respectively at right angles to each other with shearing stress of 25 MPa. Find the principal stresses, position of principal plane, maximum shear stress and its plane. 09
- (b) A cylindrical shell 3m long, 200mm internal diameter having thickness of metal 8mm is filled with fluid at atmosphere pressure. If an additional  $2000 \text{ mm}^3$  of compressible fluid is pumped into cylinder find.  
(i) Pressure exerted by fluid on cylinder  
(ii) Hoop stress induced.  
 $E=200 \text{ GPa}$ ,  $\mu = 0.3$ ,  $K$  for fluid =  $2.5 \times 10^5 \text{ m.p.a}$ . 06
- Q.10 Cantilever beam AB supports two concentrated load of 10 kN & 5 kN as shown in figure. Calculate : 15  
(i) Deflection at point C & B.  
(ii) Slope at point B & C  
By using Mac, Culay's method.



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Total No. of Printed Pages:4

**SUBJECT CODE NO:- E-350**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Mech) (CGPA) Examination Nov/Dec 2017**  
**Strength of Material**  
**(REVISED)**

[Time: Three Hours]

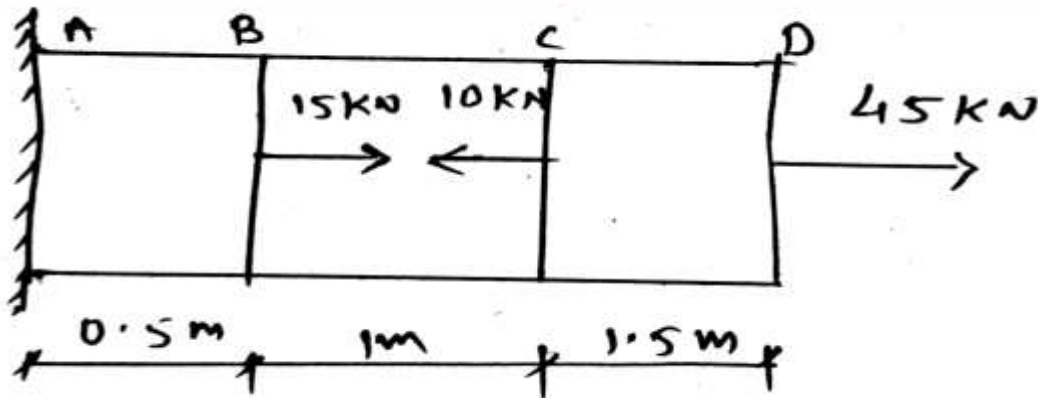
[Max.Marks:80]

Please check whether you have got the right question paper.

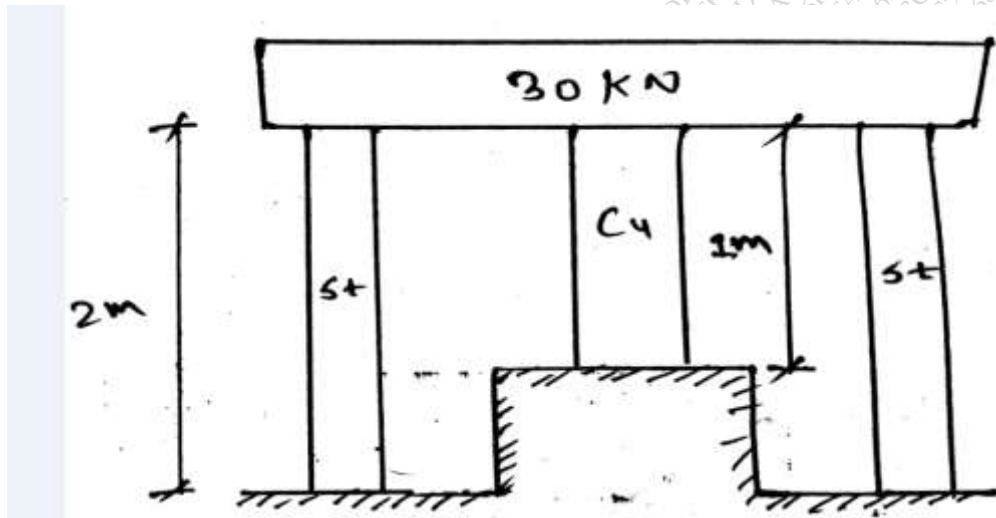
- N.B
1. Q.No.1 & 6 are compulsory. Attempt any two from remaining from each section.
  2. Figures to right indicates full marks.
  3. Assume suitable data if necessary.

**Section A**

- Q.1 Attempt any five: 10
- a) Explain Bulk modulus
  - b) Explain types of Beams.
  - c) State the relation between loading, shear force and bending moment
  - d) Define strain and types of strain
  - e) What are the assumptions in the theory of pure bending?
  - f) Explain thermal stresses
  - g) Define modulus of section
  - h) Define neutral axis.
- Q.2 a) A steel bar ABCD of cross-section  $500 \text{ mm}^2$  is acted upon by forces as shown in fig. calculate elongation of bar, take  $E = 2 \times 10^5 \text{ N/mm}^2$  07

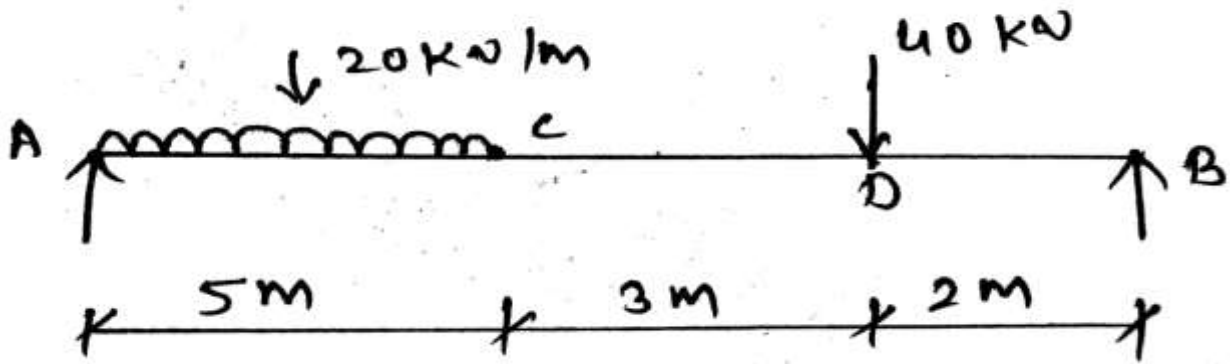


- b) Two steel rods and one copper rod each of 25mm dia., together supports a load of 30kN as shown in fig. find the stresses developed in the rods. If  $E_{steel} = 210 \text{ GPa}$ , and  $E_{copper} = 110 \text{ GPa}$



Q.3 Draw S.F.D and B.M.D for simply supported beam shown in fig.

15



Q.4 A beam of I-section is simply supported on a span of 6m. The section consists of a top flange  $60\text{mm} \times 20\text{mm}$  thick, web  $180\text{mm}$  deep &  $20\text{mm}$  thick and bottom flange  $160\text{mm} \times 40\text{mm}$  thick. Find the UDL on the beam, if the tensile stress shall not exceed  $30 \text{ N/mm}^2$ . Also find the corresponding maximum compressive stress.

15

Q.5 a) A simply supported timber beam  $150 \text{ mm}$  wide  $\times$   $300 \text{ mm}$  deep is supported over a span of  $4.5\text{m}$ . It is loaded with a uniform load of  $8 \text{ kN/m}$ . compute.

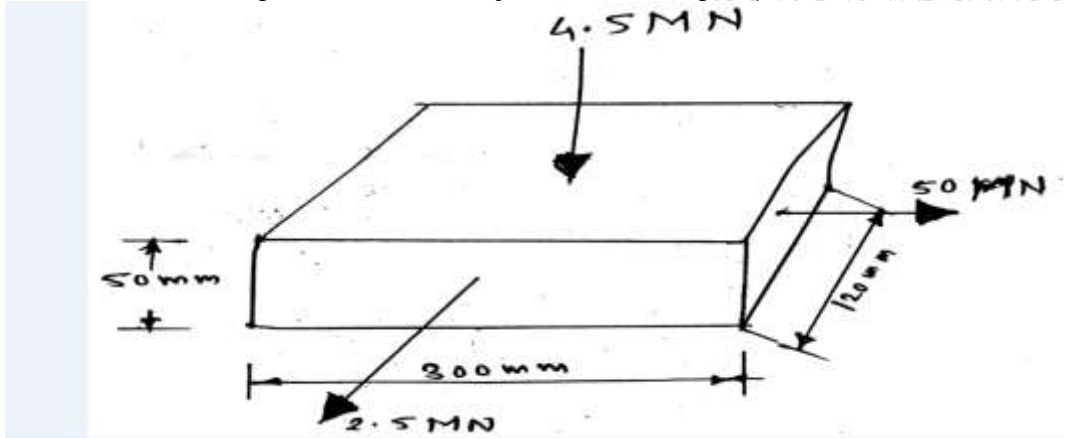
08

- 1) Shear stress developed on a layer  $60 \text{ mm}$  above the neutral axis of a section located at  $1.5\text{m}$  from the left support.
- 2) Maximum shear stress on the above section

2017

3) Maximum shear stress anywhere in the beam.

b) Determine the change in volume of object shown in fig. if  $\mu = 0.3$  and  $E = 2 \times 10^5 \text{ N/mm}^2$  07



**Section B**

Q.6 Attempt any five: 10

- Define limit of eccentricity
- State torsion formula.
- Explain core or kernel of sections.
- Define principal planes and principal stresses
- Explain types of stresses in thin cylindrical shell
- Define modulus of Resilience
- Types of loading in strain energy, state and explain.
- State the relation between bending moment and slope.

Q.7 a) A solid steel shaft has to transmit 100 kw at 160 r.p.m. taking allowable shear stress at 70 MPa. Find the suitable diameter of shaft. The maximum torque transmitted in each revolution exceeds the mean by 20%. 08

b) A vertical steel rod of uniform diameter 30mm and 2.5 m long subjected to a load of 2KN dropping from 20mm on a collar at a lower end of bar. If top end of bar is fixed, calculate, 07

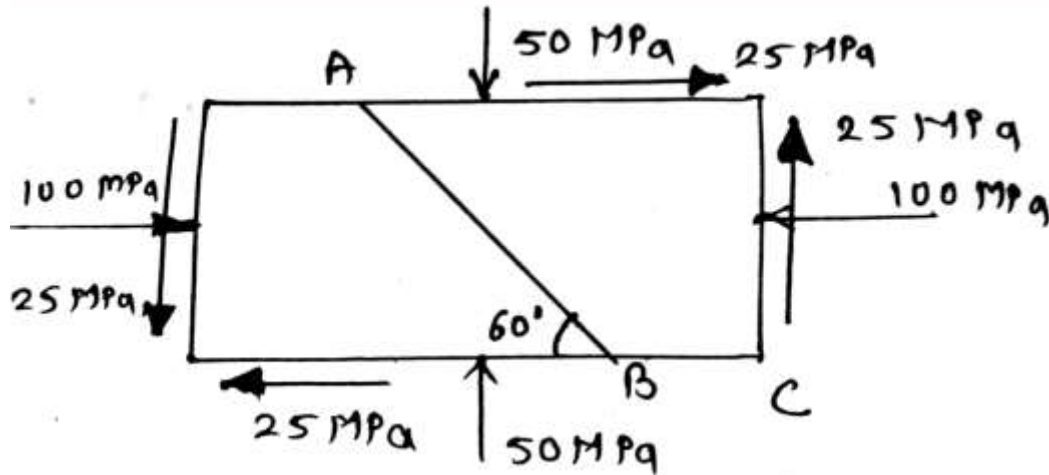
- Instantaneous stress produced
- Strain energy

Take  $E = 2 \times 10^5 \text{ N/mm}^2$

Q.8 a) A cylindrical vessel whose ends are closed by means of rigid flange plate is made of steel plate 3mm thick. The internal length and dia. of vessel are 500 mm and 250mm respectively. Determine the longitudinal and circumferential stresses in the cylindrical shell due to an internal fluid pressure 3 N/mm<sup>2</sup>. Also determine increase in length, diameter and volume of vessel. Take  $E = 200 \text{ GPa}$ ,  $\mu = 0.3$  08

- b) A rectangular column 200mm wide and 150mm thick is carrying a vertical load of 120 kN at 07 an eccentricity of 50mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in section

- Q.9 A machine component is subjected to the stresses as shown in the figure. Find the normal and shearing stresses on the section AB inclined at an angle of  $60^\circ$  with x-x axis. Also find the resultant stress on the section.



- Q.10 A beam is 10m long and is simply supported at the ends. It carries point loads of 100 kN and 60kN 15 at a distance of 3m and 5m respectively from left end. Find the deflection under each load. Find also the maximum deflection. Take  $E = 200 \text{ GPa}$ ,  $I = 18 \times 10^8 \text{ mm}^4$