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Code: 5G521

I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Engineering Mechanics-Dynamics**

( Common to CE and ME )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) A railway car is moving with a velocity of 20m/s. The diameter of the wheel is 1 m. The wheel is running on a straight rail without slipping. Find the velocity of the point on the circumference at  $60^\circ$  in the clockwise direction from the top at any instant. 7M
- b) The motion of a particle is described by the following equation:  $s = t^2 + 8t + 4$  and  $y = t^2 + 3t^2 + 8t + 4$ . Determine the (i) initial velocity of the particle (ii) velocity of the particle at  $t = 2$  s and (iii) acceleration of the particle at  $t = 3$  seconds. 7M

**OR**

2. a) A car starts from the rest on a straight road and travels with uniform acceleration of  $0.8\text{m/s}^2$  for the first 10sec and then travels with uniform velocity for the next 30 sec. It then decelerates at the rate of  $0.5\text{m/s}^2$  and comes to rest. Determine 7M
- Total time taken to complete the trip
  - Total distance travelled
- b) A ball projected vertically upwards attains a maximum height of 400 meters. Calculate the velocity of projection and compute the time of flight in air. At what altitude will this ball meet a second ball projected vertically upwards 4 seconds later with a speed of 120 meters per second 7M

**UNIT-II**

3. a) The angle of rotation of a body is given as  $\theta = f(t) = \theta_0 + at + bt^2 + ct^3$ . Derive the general expression for the angular velocity and angular acceleration of the body. 7M
- b) A flywheel of 550 mm diameter is brought uniformly from rest up to a speed of 350 rpm in 20 s. Find the velocity and the acceleration of a point on its rim 3 s after starting from rest. 7M

**OR**

4. a) The armature of an electric motor has angular speed  $N = 1800$  rpm at the instant when the power is cut-off. If it comes to rest in 6 s, calculate the angular deceleration assuming that it is constant. How many complete revolutions does the armature make during this period? 7M
- b) A roller of radius 2.5 m rolls without slipping along a horizontal plane as shown in Fig.1. The centre O has uniform velocity 25 m/s. Determine the velocity of the points A and B of the roller.

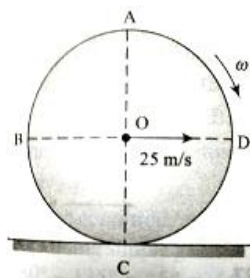


Fig.1

7M

UNIT-III
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5. Two blocks are joined by an inextensible cable as shown in Fig 2. If the system is released from rest, determine the velocity of block A after it has moved 2 m. Assume that  $\mu$  equals to 0.25 between block A and the plane and that the pulley is weightless and frictionless

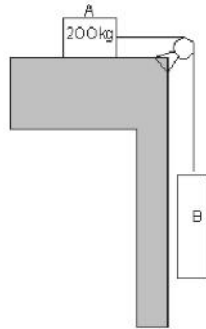


Fig.2.

14M

OR

6. For the system of connected bodies shown in Fig 3, determine the acceleration of each block and the tension in the rope. Coefficient of friction between block A and horizontal surface is 0.3. Block A and B weigh 100 N and 200 N respectively Hence find the velocity of each block after 5 sec.

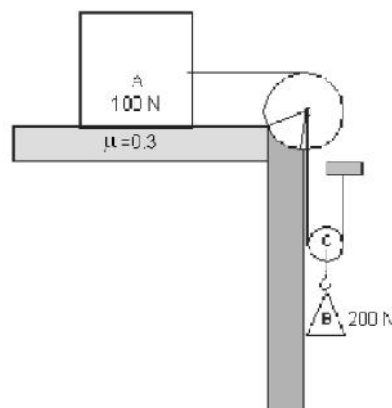


Fig.3

14M

UNIT-IV
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7. A 3000 N block starting from rest as shown in Fig.4 Slides down a  $50^\circ$  incline. After moving 2 m it strikes a spring whose modulus is 20 N/mm. If the coefficient of friction between the block and the incline is 0.2, determine the maximum deformation of the spring and the maximum velocity of the block.

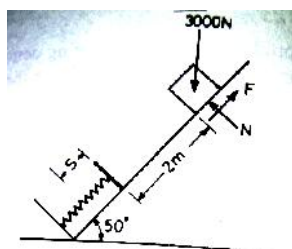


Fig.4

14M

OR

8. In what distance will body A of Fig.5. attains a velocity of 3 m/s, starting from rest.

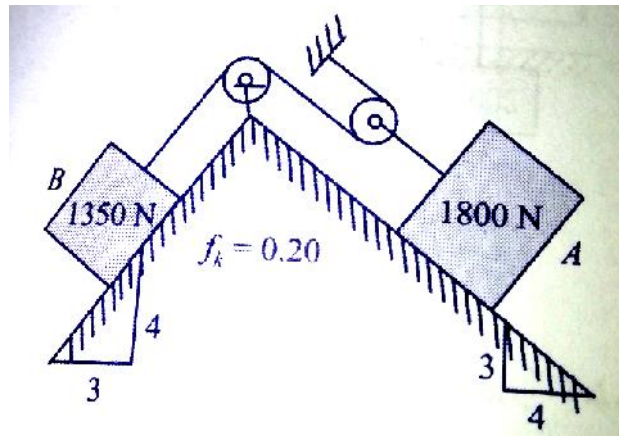


Fig.5

14M

<b>UNIT-V</b>
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9. A particle of mass  $m$  is thrown vertically downward with initial velocity  $u$  and resistance of the atmosphere  $R = kv^2$  per unit mass, where  $V$  is the velocity at any time instant  $t$ . At that instant, express the distance travelled  $S$ , as a function of  $v$ ,  $u$ , and  $c$ , where  $c^2 = g/k$ .

14M

**OR**

10. Two masses are interconnected with a pulley system, as shown in Fig.6. Neglecting inertial and frictional effect of pulleys and cord, determine the acceleration of the mass  $m_2$ . Take  $m_1 = 40$  kg,  $m_2 = 30$  kg.

14M

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Hall Ticket Number :

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**R-15**

**Code: 5GC21**

*I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016*

**Technical English**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) What is Modern Technology and how it is useful for easy administration? 7M  
b) Explain the difference between production of mass and mass production' 7M

**OR**

2. a) Explain the disadvantages of technology in about 50 words. 7M  
b) Complete the sentences as directed.  
i) She is a qualified candidate. (Write the antonym of the italicized word)  
ii) Amni took an advantage (write the synonym of the bold word)  
iii) Ravi received a \_\_\_ from his professor (fill in the blank with 'complement' / 'compliment')  
iv) The fare of the ticket is not \_\_\_\_\_.( fill in the blank with a homonym of fare)  
v) Ashu \_\_\_ the children to be doctors. (Fill in the blank with suitable phrasal verb)  
vi) The principal \_\_\_\_\_ a speech (gave/made).( Choose the right verb)  
vii) Turn left to \_\_\_\_\_ your actual place.( imagine and fill with prefix word) 7M

**UNIT-II**

3. a) Describe four pollution effects on climate in recent times. 7M  
b) What is low pressure? How does it effect on climate? 7M

**OR**

4. a) How would Lanina effect on climate? Write the expected rainfall in near future. 7M  
b) Suggest few points to protect the climate. 7M

**UNIT-III**

5. a) Write a resume for the post of Lab Assistant in an Engineering college 7M  
b) What are Photovoltaic panels?-Explain how it works. 7M

**OR**

6. a) Compare between solar power and power generated by water. 7M  
b) Rewrite the following sentences as directed.  
i) He is irregular. He failed in the examination (Change into simple sentence)  
ii) Though he poor, he is honest. (Change into compound sentence)  
iii) He switched \_\_\_\_\_ (of/off) the fan.  
iv) Sukruti \_\_\_\_\_ (rises/raises) doubts in my class.  
v) The labour handed over \_\_\_\_\_ (bond/bound) to the owner.  
vi) The Governer \_\_\_\_\_ (proceed/precede) on the dais.  
vii) I bought a \_\_\_\_\_ (teak/take) wood for the door frames. 7M

**UNIT-IV**

7. a) Write the effects on human beings that caused by water pollution. 7M  
b) Why do plastic covers remain in soil even after many years? 7M

**OR**

8. a) What are the methods to generate power form water? 7M  
b) Write a newspaper report on an accident that you have seen. 7M

**UNIT-V**

9. a) Write an essay on 'The Secret of Work in about 150 words. 10M  
b) What did you know from the essay 'unattached'? 4M

**OR**

10. a) Write in detail about the 'nature of work' that depends on human spirit. 10M  
b) Fill in the blanks with suitable connotations.  
i) He is \_\_\_\_\_ (weak/dull) to get at least pass marks.  
ii) They are \_\_\_\_\_ (forced/pushed) to get rid of hurdles.  
iii) The \_\_\_\_\_ is hiked (prize/price)  
iv) She followed \_\_\_\_\_ (Principle/principal) in her life. 4M

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Hall Ticket Number :

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**R-15**

**Code: 5GC22**

*I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016*

**Engineering Chemistry**

(Common to EEE and ECE)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Comment on impurities of water and mention the units of hardness in detail. 7M  
b) Calculate the temporary and permanent hardness of water sample containing  $Mg(HCO_3)_2=7.3mg/L$ ,  $Ca(HCO_3)_2=16.2mg/L$ ,  $MgCl_2=9.5mg/L$ ,  $CaSO_4=13.6mg/L$  7M

**OR**

2. a) Write any two internal treatment methods for industrial water purification. 7M  
b) Explain Ion-Exchange process in detail. 7M

**UNIT-II**

3. a) What are fuel cells? Write the working procedure for  $H_2-O_2$  fuel cell 7M  
b) Write a note on lead-acid batteries with chemical reactions involving. 7M

**OR**

4. a) Explain any two methods for prevention of corrosions. 7M  
b) Explain the factors which effect the corrosion. 7M

**UNIT-III**

5. a) Write the engineering applications of Bakelite and nylon-6,6. 7M  
b) Explain the preparation, properties and applications of Buna-N rubber. 7M

**OR**

6. a) Write the synthesis and applications of polyacetylene and polyaniline. 7M  
b) Comment on the role of biodegradable polymers in present scenario. 7M

**UNIT-IV**

7. a) Determine the calorific value of a fuel by using bomb calorimeter. 7M  
b) Write a note on synthesis of petrol from Fischer Tropsch's synthesis. 7M

**OR**

8. a) What is power alcohol? Mention the advantages and disadvantages of power alcohol. 7M  
b) Comment on the following  
i) Producer gas      ii) Water gas      iii) Biogas 7M

**UNIT-V**

9. a) What is the composition of Portland cement? Explain setting and hardening of it 7M  
b) Comment on refractories 7M

**OR**

10. a) What are the properties of lubricants? Explain the theory of lubrication. 7M  
b) Write any seven applications of refractories. 7M

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**Code: 5GC24***I B.Tech. II Semester Regular Examinations June 2016***Engineering Mathematics-II**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. Changing the order of integration evaluate the double integral  $\iint_R e^{x^2} dx dy$ , where the region R is given by R:  $2y \leq x \leq 2$  and  $0 \leq y \leq 1$ . 14M

**OR**

2. Evaluate the integral  $\iint_R \sqrt{x^2 + y^2} dx dy$  by changing into polar coordinates, where R is the region in the xy plane bounded by the circles  $x^2 + y^2 = 4$  and  $x^2 + y^2 = 9$ . 14M

**UNIT-II**

3. a) Find  $L^{-1} \left[ \frac{5s^2 + 3s - 16}{(s-1)(s-2)(s+3)} \right]$  7M  
b) Find  $L^{-1} \left[ \frac{6+s}{s^2 + 6s + 13} \right]$  7M

**OR**

4. Find the Laplace transform of the periodic function defined by the triangular wave  $f(t) = \begin{cases} t/a, & 0 \leq t \leq a, \\ \frac{2a-t}{a}, & a \leq t \leq 2a, \end{cases}$  and  $f(t+2a) = f(t)$ . 14M

**UNIT-III**

5. Find the solution of the initial value problem  $y'' + 4y' + 4y = 12t^2 e^{-2t}$ ,  $y(0) = 2$ ,  $y'(0) = 1$ . 14M

**OR**

6. Solve the initial value problem  $y'' + 2y' - 3y = 3$ ,  $y(0) = 4$ ,  $y'(0) = -7$ . 14M

**UNIT-IV**

7. Find the directional derivative of  $f(x, y) = x^2 y^3 + xy$  at (2,1) in the direction of a unit vector which makes an angle of  $f/3$  with x-axis 14M

**OR**

8. a) Evaluate the line integral of  $\vec{V} = x^2 \vec{i} - 2y \vec{j} + z^2 \vec{k}$  over straight line path from (-1, 2, 3) to (2, 3, 5). 7M  
b) Prove that  $\text{div curl } \vec{F} = 0$  7M

**UNIT-V**

9. Verify Green's theorem for  $\int_C [(3x - 8y^2) dx + (4y - 6xy) dy]$  where C is the boundary of the region bounded by  $x=0$ ,  $y=0$  and  $x+y=1$ . 14M

**OR**

10. Verify divergence theorem for  $\vec{F} = 4xz \vec{i} - y^2 \vec{j} + yz \vec{k}$ , taken over the cube bounded by  $x=0$ ,  $x=1$ ;  $y=0$ ,  $y=1$ ;  $z=0$ ,  $z=1$ . 14M

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**Code: 5GC23***I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016***Engineering Physics**

( Common to CE, ME, CSE and IT)

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Explain the Interference due to thin films and draw the conditions for constructive and destructive Interference. 10M
- b) A parallel beam of light of wavelength  $5890 \text{ \AA}$  is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction in to the plate is  $60^\circ$ . Calculate the smallest thick ness of the glass plate which will appear dark by reflection. 4M

**OR**

2. a) Describe the construction and working of He-Ne laser with energy level diagram 10M
- b) Derive an expression for numerical aperture of an optical fiber and calculate acceptance angle of an optical fiber if the refractive index of core and cladding are 1.623 and 1.522 respectively. 4M

**UNIT-II**

3. a) What are the miller indices? How they are obtained? 4M
- b) Describe the powder method of determination of crystal system. 7M
- c) Copper has fcc structure and the atomic radius is 0.1278 nm. Calculate the inter planar spacing of (110) and (212) planes. 3M

**OR**

4. a) What are the properties of Ultrasonics? How do you produce Ultrasonics by Piezo electric oscillator method 10M
- b) Calculate the frequency of the fundamental note emitted by Piezo-electric crystal. Use the following data:
- vibrating length = 3mm, Youngs modulus =  $8 \times 10^{10} \text{ N/m}^2$  and density of the crystal =  $2.5 \text{ gm/cm}^3$ . 4M

**UNIT-III**

5. a) Give an account of Heisenberg's uncertainty principle. Outline an idealized experiment to bring out its significance. 10M
- b) Write down the Schrodinger time independent wave equation for matter waves. Calculate energy levels of a particle confined in an infinite potential well. 4M

**OR**

6. a) Discuss the Kronig-Penny model for the motion of an electron in a periodic potential. 10M
- b) Find the relaxation time of conduction electrons in a metal of resistivity  $1.54 \times 10^{-4} \text{ Ohm-m}$ , if the metal has  $5.8 \times 10^{28}$  conduction electrons per  $\text{m}^3$  4M



**UNIT-IV**

7. a) Write the principle, working of the P-N junction diode. 7M  
b) Explain the construction and working of  
(i) LED  
(ii) Photo diode 7M

**OR**

8. a) Define Magnetic moment. Explain the origin of magnetic moment at the atomic field. 5M  
b) Write short notes on  
(i) Ferromagnetic materials  
(ii) Ferrites. 6M  
c) What are the applications of Ferrites 3M

**UNIT-V**

9. a) What are Cooper pairs? How they produce super conductivity in materials. 5M  
b) Explain Type I and Type II super conductors 5M  
c) The Transition temperature for lead is 8.7 K. The maximum critical field for the material is  $6 \times 10^5$  A/m. Lead has to be used as a super conductor subjected to a magnetic field of  $3 \times 10^6$  A/m 4M

**OR**

10. a) Write the properties of Carbon nanotubes 8M  
b) Write any four applications of Nanomaterials 6M

Hall Ticket Number :

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**R-15**

**Code: 5G121**

*I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016*

## **C Programming and Data Structures**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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### **UNIT-I**

1. a) Differentiate Structures and Union. 5M
- b) Write a C program to sort list of strings using pointers. 9M

**OR**

2. a) Write about command line arguments in C. 7M
- b) Write a program to copy the contents of one file to another file using command line argument. 7M

### **UNIT-II**

3. a) Write a C program to maintain a record of n students with four fields (Roll no, name, marks and grade). Print the marks of the student given the student name as input. 7M
- b) What is a structure? Explain the syntax of Structure declaration with example. 7M

**OR**

4. a) Explain Merge Sort with the help of an example. 7M
- b) Write an algorithm for Merge Sort and give the time complexity. 7M

### **UNIT-III**

5. Explain the complete mechanism of infix to postfix conversion using stacks. 14M

**OR**

6. Explain in detail basic operations of queue. 14M

### **UNIT-IV**

7. Write a C program to insert and delete an element in a linear linked list 14M

**OR**

8. a) Write a C program to count the number of node in a given list. 7M
- b) Write a C program to invert a given list. 7M

### **UNIT-V**

9. Write a C program to delete an element from a binary search tree. 14M

**OR**

10. a) Write a C program to insert an element in a Binary search Tree. 7M
- b) Define Graph and explain various graph representations. 7M

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Code: 5G522

I B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Engineering Graphics- II**

( Common to CE and ME )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. A pentagonal pyramid of base side 30mm and axis length 60mm is resting on HP on one of its triangular faces with its axis inclined at  $35^\circ$  to VP. Draw its projections.

**OR**

2. A cone diameter of base 60mm and height 90mm is resting on HP on the point of periphery of the base. Axis of the cone makes  $60^\circ$  with the HP and  $30^\circ$  with VP. Draw the projection of the cone when the apex is nearer to VP.

**UNIT-II**

3. A triangular pyramid, base 50mm side and axis 70mm long, stands on its base in the H.P. and a side of the base perpendicular to V.P. It is cut by a section plane, perpendicular to V.P. but inclined to H.P. such that the true shape of the section is an equilateral triangle of 60mm side. Draw the projections of the sectioned solid and determine the true shape of the section.

**OR**

4. A cone with diameter of base 50 and axis 60 long is resting on its base on HP. It is cut by a section plane inclined at  $45^\circ$  to HP and passing through the axis at a point 35 above HP. Draw the projections of the cut solid.

**UNIT-III**

5. A hexagonal pyramid, base 30mm side & axis 60mm long stands on its base in the H.P., with two base edges perpendicular to the V.P. It is cut by a section plane perpendicular to V.P., inclined at  $45^\circ$  to H.P. and passing through the midpoint of the axis, the apex portion being removed. Develop the lateral surface of the solid.

**OR**

6. A vertical square prism of base 50 side is penetrated by a horizontal square prism of base 40 side such that the axes intersect. The axis of the horizontal prism is parallel to VP and the faces of both the prisms are equally inclined to VP. Draw the projections of the two prisms, showing the lines of intersection.

**UNIT-IV**

7. a) Draw the isometric view of a pentagonal pyramid with side of base 25 and axis 60 long. The pyramid is resting on its base on HP with an edge of the base parallel to VP.  
b) Draw the isometric projection of cone, base 40mm dia and axis 60mm long.

**OR**

8. Draw the isometric projections of a square prism of 30 side of base and 60 length of axis when its axis is  
a) Vertical.  
b) Horizontal.

UNIT-V

9. The orthographic views of an object using the first angle projection method are shown in the FIGURE-2 . Draw the isometric projection.

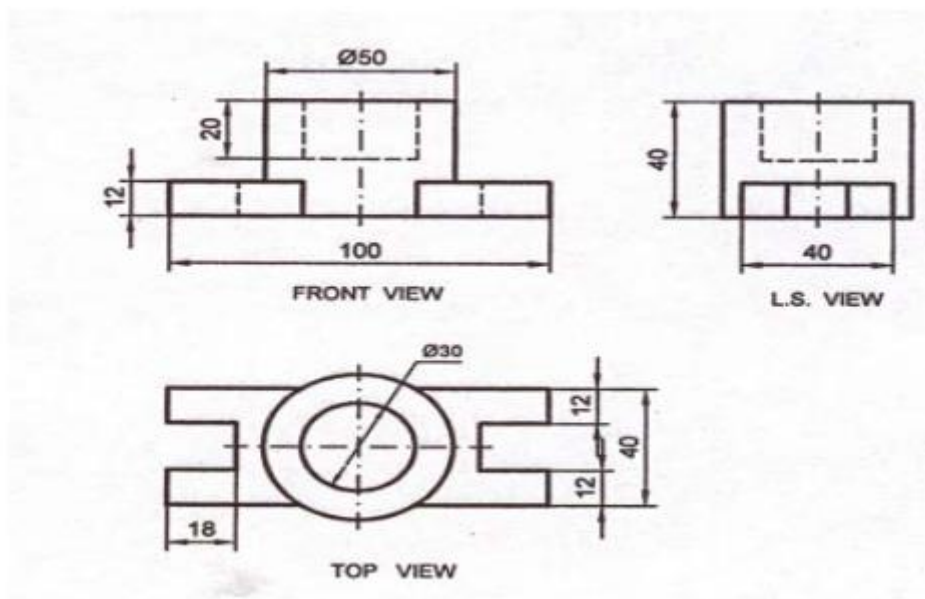
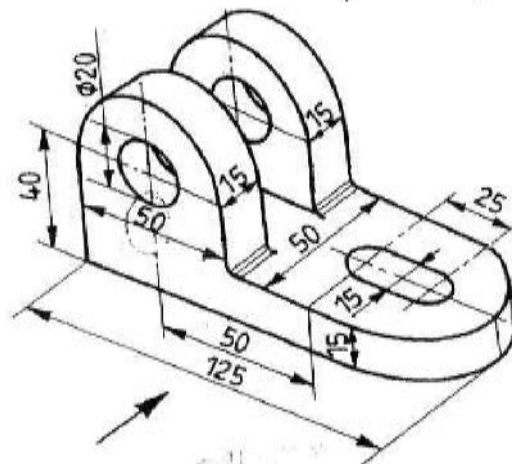


Figure 2

OR

10. Draw the front view, side view and top view for the following isometric view.



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