

Code: 7G512

I B.Tech. I Semester Supplementary Examinations May 2018

**Engineering Mechanics-Statics**

( 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 )

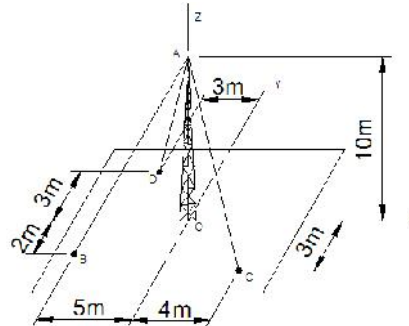
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**UNIT-I**

1. a) State and prove Varignon's theorem. 5M  
 b) Differentiate between:  
 (i) Concurrent and non-concurrent forces,  
 (ii) Coplanar and non-coplanar forces and  
 (iii) Moment of a force and couple. 9M

**OR**

2. Determine the resultant of the tension forces acting at point A of the transmission tower. The magnitude of tensions along cables AB, AC and AD are respectively 1000N, 2000N and 1800N.



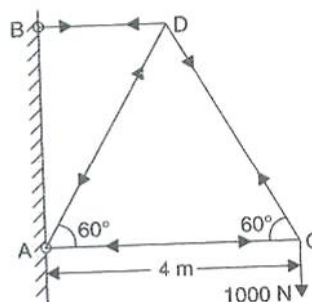
14M

**UNIT-II**

3. a) What are the advantages of method of section over method of joints? 4M  
 b) A simply supported beam of length 5 m carries a uniformly increasing load of 800N/m at one end to 1600 N/m at the other end. Calculate the reactions at both ends. 10M

**OR**

4. Determine the forces in all the members of a cantilever truss shown in figure.



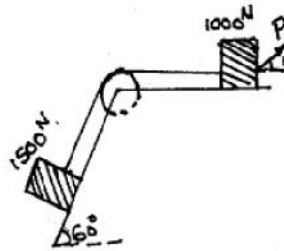
14M

**UNIT-III**

5. A uniform ladder of length 10 m and weighing 20 N is placed against a smooth vertical wall with its lower end 8 m from the wall. In this position the ladder is just to slip. Determine (i) The co-efficient of friction between the ladder and the floor and (ii) Frictional force acting on the ladder at the point of contact between ladder and floor. 14M

**OR**

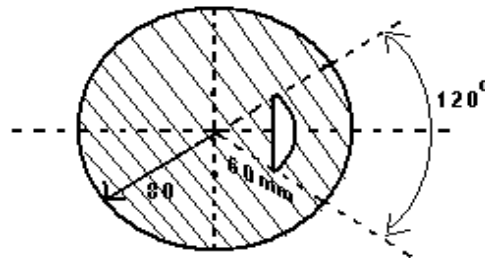
6. a) State the laws of friction. 4M  
 b) Referring to the figure, determine the least value of the force 'P' to cause motion to impend rightward. Assume the co-efficient of friction under the blocks to be 0.2 and the pulley to be frictionless.



10M

**UNIT-IV**

7. a) State and prove Pappu's theorems. 6M  
 b) Locate the centroid of the shaded area as shown in fig. resulting from removing the circular segment of 60 mm radius from the circular plate of 80 mm radius



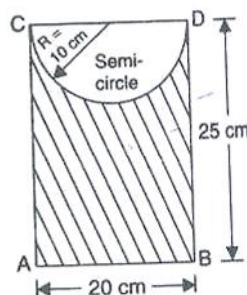
8M

**OR**

8. In a steel cylinder with a 20cm base diameter and a 30cm height, a vertical hole of 4cm base diameter is drilled upto half the depth from the top and the portion is filled with lead, whose density is  $11370 \text{ kg/m}^3$ . Determine the centre of mass of the composite body. Take the density of steel as  $7850 \text{ kg/m}^3$ . 14M

**UNIT-V**

9. a) State and prove parallel axis theorem. 6M  
 b) Find the moment of inertia of the area shown shaded in figure about edge AB.



8M

**OR**

10. A brass cone with base diameter of 400 mm and height of 225 mm is placed on a vertical aluminium cylinder of height 300 mm and diameter 400 mm. Density of brass =  $85 \text{ kN/m}^3$  and density of aluminium =  $25.6 \text{ kN/m}^3$ . Determine the mass moment of inertia of the composite body about the vertical geometrical axis. 14M

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**Code: 7GC12**

I B.Tech. I Semester Supplementary Examinations May 2018

**Engineering Chemistry**  
( Common to CE, ME and CSE )

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 ion-exchange method of softening hard water with a neat diagram. What are the advantages and disadvantages of this method? 8M
- b) Solve the total, temporary and permanent hardness of water containing the following salts:  $\text{CaSO}_4 = 28 \text{ mg/L}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 22 \text{ mg/L}$ ,  $\text{MgCl}_2 = 30 \text{ mg/L}$ ,  $\text{CaCl}_2 = 85 \text{ mg/L}$ . 6M

**OR**

2. a) Describe the zeolite process of softening hard water. List the merits and demerits of zeolite process 7M
- b) Write a short notes on
- i) Sludges and Scales
- ii) Desalination of brackish water by Reverse Osmosis 7M

**UNIT-II**

3. a) Formulate Nernst equation for the determination of potential of single electrode. 6M
- b) Describe the construction of Ni-Cd battery with the reaction occurring during discharge and charging. 8M

**OR**

4. a) Explain the mechanism of  $\text{H}_2$  evolution and  $\text{O}_2$  absorption in electrochemical corrosion. 7M
- b) What are secondary cells? Describe the construction, working principle, charging and discharging process of lithium ion battery. 7M

**UNIT-III**

5. a) What are polymers? How are they classified? Discuss addition and condensation polymerization with suitable examples. 10M
- b) How do you prepare Buna-S and Buna-N. 4M

**OR**

6. a) Explain the manufacturing process of natural rubber from latex. 7M
- b) Describe the preparation, properties and uses of Bakelite. 7M

**UNIT-IV**

7. a) What is fuel? Write the important characteristics of a good fuel. 7M
- b) Describe the fractional distillation of petroleum. 7M

**OR**

8. a) What is meant by calorific value of a fuel? Describe how calorific value of a solid fuel is determined using a Bomb calorimeter. 8M
- b) Describe the manufacture of the metallurgical coke by Otto Hoffman's by product oven method. 6M

**UNIT-V**

9. a) Write the percentage chemical composition of Portland cement. Describe the manufacture of Portland cement with necessary equations. 8M
- b) Write brief note on flash, fire, cloud and pour point. 6M

**OR**

10. a) Write failures of refractory material 6M
- b) Describe the following
- i) Thick film lubrication      ii) Extreme pressure lubrication. 8M

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**Code: 7G511**

I B.Tech. I Semester Supplementary Examinations May 2018

**Engineering Graphics-I**

( 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. Inscribe an ellipse in a parallelogram having sides 150 mm and 100 mm long and an included angle of 120 14M

**OR**

2. A point P is 30 mm and 50 mm respectively from two straight lines which are at right angles to each other. Draw a rectangular hyperbola from P within 10 mm distance from each line. 14M

**UNIT-II**

3. Construct a hypocycloid, rolling circle 50 mm diameter and directing circle 175 mm diameter. Draw a tangent to it at a point 50 mm from the centre of the directing circle. 14M

**OR**

4. A circle of 50 mm diameter rolls on a horizontal line for a half revolution and then on a vertical line for another half revolution. Draw the curve traced out by a point P on the circumference of the circle. 14M

**UNIT-III**

5. The end A of a line AB is in the H.P. and 25 mm behind the V.P. The end B is in the V.P. and 50 mm above the H.P. The distance between the end projectors is 75 mm. Draw the projections of AB and determine its true length, traces and inclinations with the two planes. 14M

**OR**

6. A line AB is in the first quadrant. Its end A and B are 20 mm and 60 mm in front of the V.P. respectively. The distance between the end projectors is 75 mm. The line is inclined at 30° to the H.P. and its H.T. is 10 mm above xy. Draw the projections of AB and determine its true length and the V.T. 14M

**UNIT-IV**

7. A semi-circular plate of 80 mm diameter has its straight edge in the V.P. and inclined at 45° to the H.P. The surface of the plate makes an angle of 30° with the V.P. Draw its projections. 14M

**OR**

8. A plate having shape of an isosceles triangle has base 50 mm long and altitude 70 mm. It is so placed that in the front view it is seen as an equilateral triangle of 50 mm sides and one side inclined at 45° to xy. Draw its top view. 14M

**UNIT-V**

9. An equilateral triangle ABC of sides 75 mm long has its side AB in the V.P. and inclined at 60° to the H.P. Its plane makes an angle of 45° with the V.P. Draw its projections by auxiliary planes method. 14M

**OR**

10. abc is an equilateral triangle of altitude 50 mm with ab in xy and c below it. abc' is an isosceles triangle of altitude 75 mm and c' is above xy. Determine the true shape of the triangle ABC, of which abc is the top view and abc' is the front view. 14M

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**R-17**

**Code: 7GC14**

I B.Tech. I Semester Supplementary Examinations May 2017

**Engineering Mathematics-I**  
( 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) Define rank of a matrix. Find the rank of the matrix  $A = \begin{bmatrix} 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ .

b) Find the values of  $k$  for which the following system of equations has a non-trivial solution  
 $(3k - 8)x + 3y + 3z = 0$ ;  $3x + (3k - 8)y + 3z = 0$ ;  $3x + 3y + (3k - 8)z = 0$ .

**OR**

2. a) Find the eigen values and eigenvectors for the matrix  $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$

b) Apply Cayley-Hamilton theorem to find the inverse of the matrix  
 $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ .

**UNIT-II**

3. Reduce the quadratic form  $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4zx$  to canonical form and specify the matrix of transformation. Also find the rank, index, signature and nature of the quadratic form.

**OR**

4. a) Show that  $A = \begin{bmatrix} \frac{1}{2}(1+i) & \frac{1}{2}(-1+i) \\ \frac{1}{2}(1+i) & \frac{1}{2}(1-i) \end{bmatrix}$  is unitary and find  $A^{-1}$ .

b) Prove that the eigen values of a Hermitian matrix are real.

**UNIT-III**

5. a) Solve:  $(1 + e^{x/y})dx + e^{x/y}(1 - x/y)dy = 0$ .  
 b) If 30% of a radioactive substance disappears in 10 days then how long will it take for 90% of it to disappear?

**OR**

6. a) Solve:  $\sec^2 y \frac{dy}{dx} + x \tan y = x^3$ .  
 b) Find the orthogonal trajectories of the family of Coaxial circles  
 $x^2 + y^2 + 2gx + c = 2$ ;  $g$  being the parameter.

## UNIT-IV

7. a) Solve:  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ .
- b) Using the method of variation of parameters, solve:  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \log x$ .

OR

8. a) Solve:  $\frac{d^2y}{dx^2} + a^2y = \tan ax$ .
- b) The differential equation for a circuit in which self-inductance neutralize each other is  $L\frac{d^2i}{dt^2} + \frac{i}{c} = 0$ . Find the current  $i$  is a function of  $t$ , given that  $I$  is the maximum current and  $i = 0$  when  $t = 0$ .

## UNIT-V

9. a) If  $u = 3x + 2y - z$ ,  $v = x - 2y + z$ , and  $w = x(x + 2y - z)$  then show that they are functionally related, and find the relation.
- b) Using mean value theorems, prove that (if  $0 < a < b < 1$ ),  

$$\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}$$
.

OR

10. a) The sum of three numbers is constant. Prove that their product is maximum when they are equal.
- b) Discuss the maxima and minima of  $f(x, y) = x^3 y^2 (1 - x - y)$ .

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**Code: 7G111**

I B.Tech. I Semester Supplementary Examinations May 2018

**Problem solving techniques and C Programming**

( 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) Explain briefly about different computer languages. 7M  
 b) Explain the software development method in detail. 7M

**OR**

2. a) What is algorithm? What are the main steps followed in the development of an algorithm? 8M  
 b) Draw flowchart and write algorithm to find sum of the digits in a given number. 6M

**UNIT-II**

3. a) Explain about the basic data types in C language with examples 8M  
 b) Write a C program to swap (exchange) the values of two variables without using temporary variable. 6M

**OR**

4. a) What is meant by type conversion? Why is it necessary? Explain about implicit and explicit type conversion with examples. 9M  
 b) Write a program to enter two numbers and find the largest of them. Use conditional operator. 5M

**UNIT-III**

5. a) Explain various selection statements available in C language with examples. 8M  
 b) Write a program to print whether a given number is prime or not. 6M

**OR**

6. a) Explain various iterative statements available in C language with examples. 8M  
 b) Write a program to find out whether the given number is Armstrong or not? 6M

**UNIT-IV**

7. a) What is Array? Discuss about the initialization and accessing of array elements in one dimensional and two dimensional arrays. 8M  
 b) Write a program to find the maximum element of an array. 6M

**OR**

8. a) Explain the following string handling functions with examples:  
 (i) strcpy( ) (ii) strcat( ) (iii) strcmp( ) (iv) strlen( ) 8M  
 b) Write C program to concatenate two strings without using strcat( ) function 6M

**UNIT-V**

9. a) Explain about call by value and call by reference mechanisms with examples 8M  
 b) What are the standard header files used in 'C'? Explain their functions. 6M

**OR**

10. Explain about different storage classes with examples 14M

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R-17

Code: 7GC11

I B.Tech. I Semester Supplementary Examinations May 2018

**Technical English & Professional Communication**

( 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) How does E.F.Schumacher substantiate his view that technology causes more problems than it offers solutions?
- b) Fill in the blanks in the following sentences using the hints given in brackets.
  - i. Though my handwriting is not beautiful, it is not \_\_\_\_\_. ( a word with the prefix il-)
  - ii. Just because I forgot to write one sub-heading, the teacher asked me to \_\_\_\_\_ the whole assignment. ( a word with the prefix re-)
  - iii. It was really a \_\_\_\_\_ that the child was not killed in a ghastly accident. ( surprise / miracle)
  - iv. \_\_\_\_\_ a minute. I am almost ready. ( phrasal verb with hang)
  - v. You will \_\_\_\_\_ a lot of fun in New York. ( have / make)

**OR**

2. Explain in brief the major elements of human communication.

**UNIT-II**

3. a) What do human beings often tend to forget when engaging in large- scale developmental activities?
- b) Write a letter of application for your dream job in your dream company. Enclose your resume.

**OR**

4. What are the five Communication Flows in an organization? Explain them in brief.

**UNIT-III**

5. a) Which is the country that figure among the top countries in the world as well as Europe in using solar power and why?
- b) i. The conditions in Andhra Pradesh are \_\_\_\_\_ to establish new industries. ( congenial / congenital)
- ii. He is a specialist in \_\_\_\_\_ Mathematics. (discreet/ discrete)
- iii. She lost the case in the court because her \_\_\_\_\_ misled her. ( council/ counsel)
- iv. He was liked by all his friends for his \_\_\_\_\_ innocence. (childish / childlike)
- v. Of the few books you gave me, I liked the \_\_\_\_\_. (later/ latter)

**OR**

6. How does Body Language help during Presentation Skills?

**UNIT-IV**

7. a) How does water help in the formation of fertile land?
- b) Assuming that you are the Regional Representative of the Central Institute of Environmental Studies, New Delhi, write a formal report to the Director of the Institute on the problem of air pollution in an urban area of your region. Make specific recommendations to minimize air pollution.

**OR**

8. What are the different methods used to remove Barriers of Communication?

**UNIT-V**

9. Discuss the two ways in which one can work without expecting anything in return.

**OR**

10. Write in brief the different kinds of models of communication.

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