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<b>R-19</b>
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**Code: 19AC11T**

I B.Tech. I Semester Supplementary Examinations August 2021

**Algebra and Calculus**

( 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 the rank of the matrix and find the rank of  $\begin{bmatrix} 0 & 1 & -3 & 1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$  by using Echelon form. 7M

b) Investigate the values of  $\lambda$  and  $\mu$  so that the equations  $2x+3y+5z=9, 7x+3y-2z=8, 2x+3y+\lambda z=\mu$ , have (i) no solution, (ii) a unique solution and (iii) an infinite number of solutions. 7M

**OR**

2. Find the Eigen values and Eigen vectors of the matrix  $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$  14M

**UNIT-II**

3. If  $A = \begin{bmatrix} 2 & 1 & 2 \\ 5 & 3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$ , verify Cayley-Hamilton theorem. Hence find  $A^{-1}$  and  $A^4$ . 14M

**OR**

4. Reduce the Quadratic form  $x^2 + 3y^2 + 3z^2 - 2yz$  to a canonical form by an orthogonal transformation and discuss its nature also find the modal matrix. 14M

**UNIT-III**

5. a) If  $U = \log(x^3 + y^3 + z^3 - 3xyz)$  prove that  $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 U = \frac{-9}{(x+y+z)^2}$  7M

b) In a plane triangle, find the maximum value of  $\cos A \cos B \cos C$  7M

**OR**

6. a) If  $x + y + z = u, y + z = uv, z = uvw$ , then evaluate  $\frac{\partial(x, y, z)}{\partial(u, v, w)}$  7M

b) Find the minimum value of  $x^2 + y^2 + z^2$  given  $x + y + z = 3a$ . 7M

**UNIT-IV**

7. a) Obtain the Taylor's series expansion of  $\sin 2x$  about  $x = \frac{\pi}{4}$ . 7M

b) Trace the curve  $x^3 + y^3 = 3axy$ . 7M

**OR**

8. a) Obtain the Maclaurin's series expansion of  $\log(1+\sin^2 x)$  up to the term containing  $x^6$ . 7M
- b) Trace the curve  $r^2 = a^2 \cos 2\theta$ . 7M

## UNIT-V

9. a) Evaluate the double integral  $\iint_R xy \, dx \, dy$  where 'R' is the region bounded by the lines  $x$ -axis, ordinate  $x = 2a$  and  $x^2 = 4ay$  7M
- b) Show that  $\Gamma(n) = \int_0^1 \left( \log \frac{1}{y} \right) dy$  ( $n.0$ ) 7M

## OR

10. a) Evaluate the integral by changing the order of integration  $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy \, dx$  7M
- b) Show that  $S(p, q) = \int_0^\infty \frac{y^{q-1}}{(1+y)^{p+q}} dy = \int_0^1 \frac{x^{p-1} + x^{q-1}}{(1+x)^{p+q}} dx$  7M

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Hall Ticket Number :

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**R-19**

**Code: 19AC12T**

I B.Tech. I Semester Supplementary Examinations August 2021

**Applied Physics**

( Common to EEE & ECE )

Max. Marks: 70

Time: 3 Hours

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

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**UNIT-I**

1. a) Derive the expressions for diameters of dark and bright Newton's rings. 8M  
b) Explain construction and working of Nicol prism. 6M

**OR**

2. Describe the Fraunhofer diffraction due to double slit and derive the conditions for maxima and minima. 14M

**UNIT-II**

3. a) Define Ionic polarization and derive the expression for ionic polarizability. 7M  
b) Define and derive the Internal field. 7M

**OR**

4. a) Distinguish the soft and hard magnetic materials. 6M  
b) Explain domain theory of ferromagnetism 8M

**UNIT-III**

5. a) State and prove Stokes theorem for curl. 7M  
b) Derive expression for propagation of electromagnetic waves in non-conducting media. 7M

**OR**

6. a) With the help of block diagram, explain an optical fiber communication system and discuss the function of each block. 8M  
b) Illustrate various attenuation mechanisms in optical fibers. 6M

**UNIT-IV**

7. a) With the help of band diagrams explain p & n type semiconductors and discuss the effect of temperature on charge carrier concentration in n-type semiconductors. 10M  
b) Summarize applications of semiconductors. 4M

**OR**

8. a) Explain the terms drift and diffusion and obtain their expressions in semiconductors. 8M  
b) Derive Einstein's relation and give significance of it. 6M

**UNIT-V**

9. a) Explain classification of superconductors into type I and type II. 8M  
b) Discuss essential features of BCS theory of superconductivity. 6M

**OR**

10. a) Explain the construction and working of Chemical vapor deposition method to prepare nanoparticles. 8M  
b) Explain the working principle of SEM with neat diagram. 6M

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Code: 19A411T

I B.Tech. I Semester Supplementary Examinations August 2021

**Essentials of Electrical & Electronics Engineering**

( Common to EEE &amp; 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**

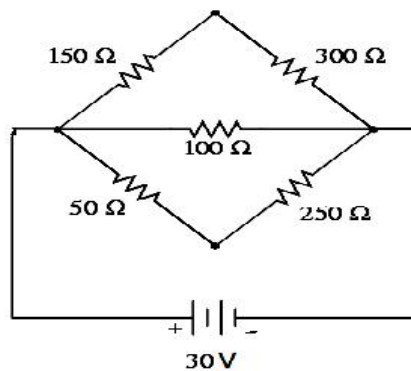
1. a) Classify the types of resistors. Explain fixed resistors with neat diagram. 8M  
 b) Determine the color coding for the following resistors. 6M  
 i) 4.7K ii) 22K iii) 10K

**OR**

2. a) With neat sketches explain the dependent and independent sources. 7M  
 b) Classify the types of capacitors. Explain about any two fixed capacitors with neat sketches. 7M

**UNIT-II**

3. a) State and explain Kirchhoff's laws with an example. 7M  
 b) Determine the current flowing through 100 resistor using KCL and KVL in the following circuit.

**OR**

4. a) Explain about the source transformation technique with an example. 7M  
 b) State and explain Maximum power transfer theorem with an example. 7M

**UNIT-III**

5. a) Demonstrate how temperature effect the characteristics of PN junction diode? 8M  
 b) The voltage across a silicon diode at room temperature of 300°K is 0.62V when 2mA current flow through it. If the voltage increases to 0. 8V, calculate the new diode current 6M

**OR**

6. a) Explain energy band diagrams of intrinsic and extrinsic semiconductors with neat sketches. 7M  
 b) Differentiate the avalanche breakdown and Zener breakdown. 7M

**UNIT-IV**

7. Explain the working of full wave bridge rectifier with neat diagram. Derive the expression for ripple factor and efficiency. 14M

**OR**

8. a) Compare L-filter and C-filter. 5M  
 b) The Half wave rectifier circuit is supplied with a 230V AC through 3:1 Step down Transformer with a resistive load of 10K , the diode forward resistance is 75 and transformer secondary winding resistance 10 . Calculate step- down voltage,  $V_{DC}$ ,  $I_{DC}$ ,  $V_{RMS}$ ,  $I_{RMS}$ , Rectifier efficiency, and  $P_{DC}$ . 9M

**UNIT-V**

9. a) Explain the construction and operation of NPN transistor. 7M  
 b) Explain the Input and Output characteristics of transistor in CE configuration. 7M

**OR**

10. a) With block diagram explain the operation of function generator. 7M  
 b) Explain the operation of CRO with neat block diagram. 7M

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Code: 19A312T

I B.Tech. I Semester Supplementary Examinations August 2021

**Engineering Graphics & Design**

( Common to EEE &amp; 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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Marks CO Blooms Level

**UNIT-I**

1. Construct an ellipse, when the distance of the focus from the directrix is equal to 65mm and eccentricity is  $2/3$ . Also draw tangent and normal to the curve at a point 40mm from the directrix

14M CO1 L3

**OR**

2. a) Divide a straight line AB of length 50 mm, into 9 equal parts  
b) Construct a regular Pentagon.

7M CO1 L4

7M CO1 L3

**UNIT-I**

3. A circle of 40mm diameter rolls on a horizontal line without slipping. Draw the curve traced by a point R on the circumference of the circle for one half revolution. For remaining half revolution the circle rolls on the vertical line. The point R is vertically above the centre of the circle in the initial position.

14M CO2 L3

**OR**

4. A string is unwound from a drum of 30mm diameter. Draw the locus of the free end of the string for unwinding through an angle of  $360^\circ$ .

14M CO2 L3

**UNIT-I**

5. a) The top view of a 75mm long line AB measures 65mm, while the length of its front view is 50mm. Its one end A is in H.P. and 12mm in front of the V.P. Draw the projections of AB and determine its inclinations with the H.P. and the V.P.

14M CO3 L3

- b) The top view of a 75mm long line AB measures 65mm, while the length of its front view is 50mm. Its one end A is in H.P. and 12mm in front of the V.P. Draw the projections of AB and determine its inclinations with the H.P. and the V.P.

14M CO3 L3

**OR**

6. The top view of a 75mm long line AB measures 65mm, while the length of its front view is 50mm. Its one end A is in H.P. and 12mm in front of the V.P. Draw the projections of AB and determine its inclinations with the H.P. and the V.P.

14M CO3 L3

**UNIT-I**

7. A rectangular plane ABCD inclined to HP by an angle  $30^\circ$ , its shorter edge being parallel to HP and inclined to VP by an angle  $45^\circ$ . Draw its projections.

14M CO 4 L3

**OR**

8. A semicircular plate of 80 mm diameter has its straight edge in the VP and inclined at  $45^\circ$  to the HP. The surface of the plate makes an angle of  $30^\circ$  with the VP. Draw its projections.

14M CO4 L3

**UNIT-I**

9. A square prism with side of base 30 mm and axis 50 mm long has its axis inclined at  $60^\circ$  to HP on one of the edges of the base which is inclined at  $45^\circ$  to VP.

14M CO5 L3

**OR**

10. Study the isometric view of the Figure 1 and draw the front, top and right side views.

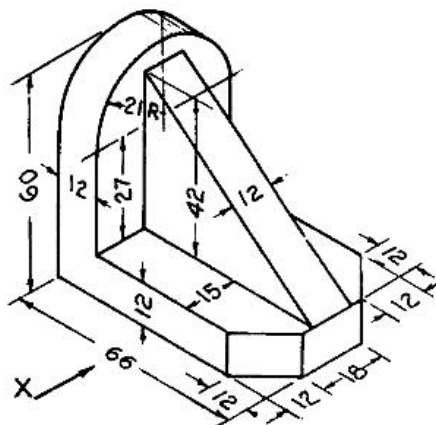


Figure 1

14M CO5 L3

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Hall Ticket Number :

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R-19

Code: 19A511T

I B.Tech. I Semester Supplementary Examinations August 2021

## Problem Solving 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) Define Algorithm. Explain the characteristics of algorithm 7M
- b) List and explain briefly about various computer languages 7M

OR

2. a) What is meant by flow chart? Explain the symbols used in flowchart with an example. 7M
- b) Discuss about C data types. 7M

### UNIT-II

3. a) What are the different types of arrays in C? Explain with a suitable example. 7M
- b) Write a C program to find the factorial of a given number. 7M

OR

4. a) Explain conditional statements with an example. 7M
- b) Write a c program to print array of elements in ascending order using bubble sort. 7M

### UNIT-III

5. a) Define string. Explain declaration of string. Explain any three string handling functions. 6M
- b) What is recursion? Explain with an example 8M

OR

6. Explain the following key words with example. i) auto ii) register iii) static iv) extern. 14M

### UNIT-IV

7. a) What is pointer? How to initialize and declare pointer variables? 7M
- b) Explain dynamic memory allocation functions. 7M

OR

8. a) Write a C program to demonstrate array of pointers. 7M
- b) Explain different parameter passing techniques with suitable examples. 7M

### UNIT-V

9. Define structure and union. Explain the syntax and accessing elements from structure and union with an example. Write the differences between structures and unions 14M

OR

10. a) Define file. Write a C program to write character to a file and reading character from file. 8M
- b) Give brief description about the various modes of a file. 6M

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