Code No: **R18A0021**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
I B.Tech I Semester Supplementary Examinations, July/August 2021
Mathematics-I
(EEE, ME, ECE, CSE, IT & AE)

Roll No

Time: 3 hours   **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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1

a) Reduce the matrix to normal form and hence find its rank $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ **[6M]**

b) Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and find its   **[8M]**

inverse

2   a) Test for consistency and solve   **[6M]**
$2x - 3y + 7z = 5, 3x + y - 3z = 13, 2x + 19y - 47z = 32.$

b) Find the eigen values and the eigen vectors of the matrix $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}$ **[8M]**

3

a) If $u = x + y + z, uv = y + z, uvw = z$ show that $J\left(\dfrac{x, y, z}{u, v, w}\right) = u^2 v$ **[7M]**

b) Find the maximum and minimum values of $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72$ **[7M]**

4   a) Discuss the maxima and minima of $f(x) = x^3 y^2 (1 - x - y)$ **[7M]**

b) Prove that $u = 3x + 2y - z, \ v = x - 2y + z, \ w = x(x + 2y - z)$ are functional dependent and find the relation between them   **[7M]**

5   Solve $(D^2 + 4D + 3)y = e^{-x}\sin x + xe^{3x}$ **[14M]**

6   a) Solve $y'' + 4y' + 4y = 3\sin x + 4\cos x$ **[7M]**

b) Solve $\dfrac{d^2 y}{dx^2} + 4y = \tan 2x$ by the method of variation of parameters [7M]

7   a)   Solve px+qy=z [6M]

b)   Solve $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial z}{\partial x} + \dfrac{\partial z}{\partial y} = 0$ by method of separation of variables [8M]

8

a)   Find the Laplace transform of $\dfrac{e^{-at} - e^{-bt}}{t}$ [6M]

b)   Using Convolution theorem, find $L^{-1}\left\{\dfrac{s^2}{(s^2 + 4)(s^2 + 9)}\right\}$ [8M]

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R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
I B.Tech I Semester Supplementary Examinations, July/August 2021
Programming for Problem Solving
(EEE, ME, ECE, CSE, IT & AE)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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1 a) Describe in detail about computer hardware and software.   **[7M]**
   b) Draw the flowchart and write a C program to compute simple interest.   **[7M]**

2   a) Write the general structure of C. Explain with an example   **[7M]**
   b) Explain the following operators in C language i) Relational ii) Logical iii)   **[7M]**
       Conditional.

3 Develop a C program that reads from the user an arithmetic operator and two   **[14M]**
   operands, perform the corresponding arithmetic operation on the operands using
   switch statement.

4   a) Write a C program to find the factorial of a number using do-while ,where   **[10M]**
       the number n is entered by user.
   b) Write a program to display multiplications tables from 1 to n.   **[4M]**

5 Create a function to calculate of the installment for a housing loan. Show the   **[14M]**
   interest and principal portion of the loan. The interest rate is either fixed or
   floating. The fixed interest is assumed to be 8.5 and the floating rate is as given by
   the user. Let the function with three arguments(p,r,n).
$$\text{EMI} = P \times r \,[(1+r)n \,/(1+r)n-1\,] \times 1/12$$
$$P = \text{principal(loanamount)}$$
$$r = \text{rate of interest}$$
$$n = \text{term of the loan}$$

6 Write the output of following programs: **[14M]**
   I.   #define cube(x) x*x*x
       int main()
       {
               printf("%d", cube(5+2)):
               return (0);
       }

   II.   #define max2(a,b) a>b?a:b
       int main()
       {

```
        int x=2.y=3,z;
        z=2+max2(x,y);
         printf("z = %d", z):
        return (0);
}
```

III.   int main()
```
{
    int n=7,p;
    p=n++;
    printf("p=%d n=%d\n",p,n);
    p=++n;
    printf("p=%d n=%d\n",p,n);
    printf("%d%d%d\n",n++,n++,n++);
    printf("%d%d%d\n",++p,++p,++p);
    return (0);
}
```

IV.   int main()
```
{
    int i= 8, j = 5;
    float x = 0.005, y = -0.01;
    char c = 'c', d = 'd';
     printf("%d", (3*i-2* j)%(2*d-c));
     printf("%d", 2 * ((i / 5) + (4 * (j - 3)) % (i + j - 2)));
    return (0);
}
```

7   a) Develop a C program to find the sum of each row and each column of 2D   **[7M]**
            marix.
         b) Write a C program to find the largest element in an array   **[7M]**

8   a) Demonstrate the concept of union with required examples.   **[7M]**
         b) Construct a C program using pointers to compute the sum of all elements stored   **[7M]**
         in an array.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
I B.Tech I Semester Supplementary Examinations, July/August 2021
Engineering Graphics
(EEE, ECE, CSE & IT)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Answer Any **Five** Questions
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***

1 a) Construct regular polygon of 5 sides, with the length of the side as 25, by general method?   **[7M]**

b) Construct a scale of 1:8 to show decimeters and centimeters and to read upto 1 m. Show a length of 7.6 dm on it?   **[7M]**

2 Construct a parabola, with the distance of the focus from the directrix as 50. Also, draw normal and tangent to the curve, at a point 40 from the directrix?   **[14M]**

3 a) A point A is 20 above H.P, 30 in front of V.P and 25 in front of P.P. Draw front view, top view and left side view of the point?   **[6M]**

b) A point A is on H.P and 40 in front of V.P. Another point B is on V.P and below H.P. The line joining their front views makes an angle of 45º with xy, while the line joining their top views makes an angle of 30º. Find the distance of the point B from H.P.   **[8M]**

4 a) A line AB of 75 length has its end A 15 above H.P and 20 in front of V.P. The length of top view is 50 and the top view makes an angle 45º with xy .Draw the projections?   **[7M]**

b) A line AB is on H.P and its one end A is 20 in front of V.P. The line makes an angle of 45ºwith V.P and its front view is 60 long. Draw the projections of the line and determine the true length?   **[7M]**

5 a) Draw the projections of a regular pentagon of 25 side with its surface making an angle of 45º with H.P. One of the sides of the pentagon is parallel to H.P and 15 away from it.   **[7M]**

b) A rectangular plane of size 60 x 30 has its shorter side on H.P and inclined at 30º to V.P. Draw the projections of the plane, if its surface is inclined at 45º to H.P   **[7M]**

6 Draw the projection of hexagonal prism of base 25 side and axis 60 long when it is resting on one of its corners of the base on HP the axis of the solid is inclined at 45º to HP.   **[14M]**

7 a) Draw the isometric drawing of a cylinder of base diameter 25 and axis 40 long. use the box method.   **[7M]**

b) Draw the isometric drawing of a cone of base diameter 30 and axis 45 long. use the off-set method.   **[7M]**

8 Draw Front View, Top view and Side view for the figure shown below. All **[14M]** dimensions are in mm.

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R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
I B.Tech I Semester Supplementary Examinations, July/August 2021
Applied Physics
(EEE, ECE, CSE, IT)

Roll No									

Time: 3 hours   **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1	**a)** Derive an expression for Schroedinger time independent wave equation.	**(7M)**
	b) Explain how Davisson and Germer experiment used to prove the existence of matter waves.	**(7M)**
2	**a)** What are matter waves? Derive an expression for de-Broglie wavelength of an electron.	**(7M)**
	b) Write a note on physical significance of wave function and based on quantum physics show that the energy levels of an electron are discrete.	**(7M)**
3	**a)** Explain the merits and demerits of Classical Free electron Theory	**(7M)**
	b) Explain the concept of Fermi level.	**(7M)**
4	**a)** Explain E-K curve.	**(7M)**
	b) Discuss the origin of energy band structure in solid and write the advantages of energy band structures	**(7M)**
5	**a)** Write a short note on intrinsic and extrinsic semiconductors. Explain the variation of Fermi level with respective to temperature in intrinsic semiconductor.	**(7M)**
	b) Explain the diffusion and drift. With a suitable graphs discuss the V-I Characteristics of a PN junction.	**(7M)**
6	Define the Hall Effect and describe an experimental setup for the measurement of the Hall Co-efficient.	**(14M)**
7	**a)** Deduce the Clausius-Mossotti equation and write its importance.	**(7M)**
	b) Describe the origin of domain theory of ferromagnetism and distinguish between soft and hard magnetic materials.	**(7M)**
8	**a)** Explain the construction and working of Ruby laser and write any two Industrial applications of it.	**(7M)**
	b) Define the numerical aperture of a fiber and explain in detail about the various parts involved in an optical fiber communication system.	**(7M)**

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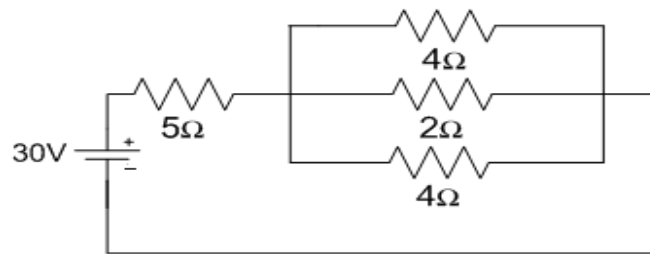**Basic Electrical and Electronics Engineering**
(ME & AE)

Roll No										

Time: 3 hours   **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1(a)	Define Ohm's Law and List the applications of it.	**[7M]**
(b)	Determine the total current in the circuit	**[7M]**

|		
2(a)	Illustrate KVL & KCL with an example.	**[7M]**
(b)	Three resistances 100 Ω, 200 Ω and 300 Ω are connected in series to a 250 volt supply. Determine the total resistance, current in the circuit and the power dissipated in each resistor.	**[7M]**
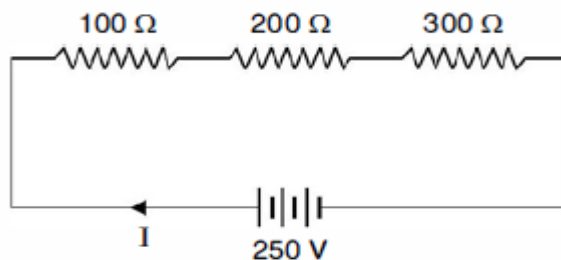
3(a)	Find the current through 3Ω resistor using superposition theorem in the circuit	**[7M]**
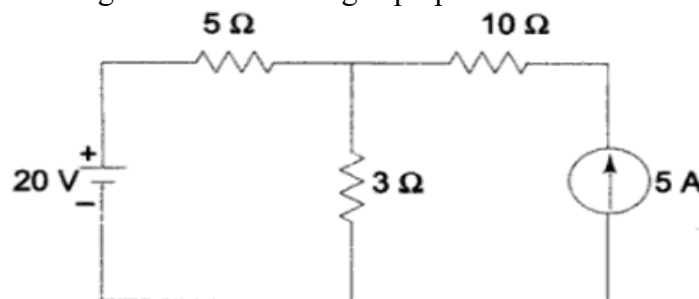
(b)	Discuss the steps to determine the Norton's equivalent circuit.	**[7M]**

4(a) Determine the power dissipation in 4Ω resistor of the circuit shown in the fig. **[7M]**
using mesh analysis.
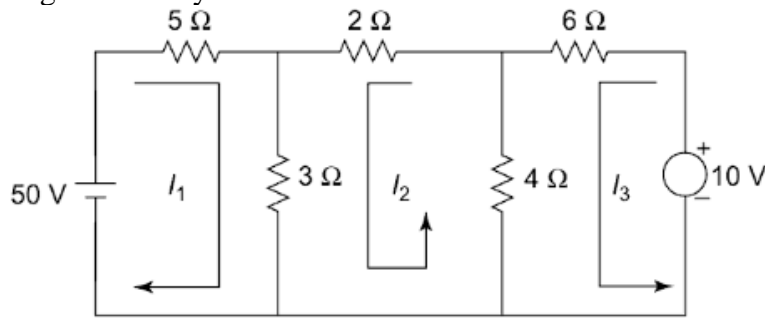
(b) Illustrate the source transformation technique with an example. **[7M]**

5(a) Describe the construction of DC machine. **[7M]**
(b) Prove that torque developed by DC motor is **[7M]**

$$0.159\left(\frac{ZP}{A}\right)I_a\emptyset$$

6(a) Discuss the principle of operation of 1-phase transformer. **[7M]**
(b) Derive the emf equation of a transformer. **[7M]**

7(a) Discuss the operation of pn junction diode. **[7M]**
(b) Describe how Zener diode can work as a regulator with relevant diagram. **[7M]**

8(a) Discuss the mechanism of operating transistor as an amplifier. **[7M]**
(b) Analyse the output characteristics of a common base transistor configuration. **[7M]**

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R18

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(Autonomous Institution – UGC, Govt. of India)
I B.Tech I Semester Supplementary Examinations, July/August 2021
Engineering Chemistry
(ME & AE)

Roll No									

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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1	a)	What is EMF? Write experimental procedure of Potentiometric titration of strong acid vs strong base.	**[7M]**
	b)	Explain the functioning of Lead acid battery cell with neat diagram and reactions involved in it.	**[7M]**
2	a)	Write in detail theories involved in corrosion.	**[7M]**
	b)	Write a note on of applications of metallic coatings method of controlling corrosion.	**[7M]**
3	a)	Draw the molecular orbital diagram of N_2 and based on it comment on magnetic and spin only properties of the N_2 molecule.	**[7M]**
	b)	Compare molecular and atomic orbitals in detail.	**[7M]**
4	a)	Explain the features of Crystal Field Theory .	**[7M]**
	b)	Explain Crystal field splitting of transition metal ion d-orbitals in Tetrahedral geometry.	**[7M]**
5	a)	What is potable water? Explain its specifications.	**[7M]**
	b)	Write a short note on desalination of water by Reverse Osmosis.	**[7M]**
6	a)	How Hardness of water is measured? Write different units of Hardness of water and their relationship among them.	**[7M]**
	b)	Write a short note on following disinfection techniques. i) Ozonization ii) Chlorination	**[7M]**
7	a)	State and explain Markownikoff's addition of HBr to Propene with suitable mechanism.	**[7M]**
	b)	How $KMnO_4$ and Chromic acid oxidizes alcohols? Explain with suitable mechanism.	**[7M]**
8	a)	What characteristics should a good fuel possess?	**[7M]**
	b)	Write a short note on following terms i) Octane Number ii) Cetane Number	**[7M]**

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