

Code No: R18A0012

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021**Applied Physics
(EEE, ECE, CSE, IT)**

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Time: 2 hours 30 min**Max. Marks: 70**

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

- 1 a) What are matter waves? Show that matter wave travels more than light speed. (7M)
b) Explain how the G.P. Thomson's experiment is used to explain the existence of matter waves. (7M)
- 2 a) Define the Heisenberg uncertainty principle and explain its consequences. (7M)
b) Show that the energy of an electron confined in a 1-dimension potential well of length 'L' and infinite depth is quantized. (7M)
- 3 a) Explain the concept of density of states and derive an expression for it. (7M)
b) Discuss in detail about the behavior of an electron moving in a periodic potential region by Kronig-Penny model. (7M)
- 4 a) Explain the Bloch theorem and the concept of effective mass of an electron. (7M)
b) Write a detailed note the classification of metals, semiconductors and insulators based on band theory of solids. (7M)
- 5 a) Derive an expression for carrier concentration of electrons an intrinsic semiconductor. (7M)
b) What is meant by photovoltaic effect? Describe the construction and working of a solar cell and also write any two applications of it. (7M)
- 6 a) What are the differences between elemental and compound semiconductors? (7M)
b) Explain the formation of a PN junction diode and draw the energy band diagram of a open circuited PN junction diode. (7M)
- 7 a) Write the different types of polarization mechanism in dielectrics and derive an expression for electronic polarizability. (7M)
b) What is ferromagnetism? How the hysteresis curve is explained on the basis of the domain theory? (7M)
- 8 a) Explain the construction and working of He-Ne gas laser and write any two applications of it. (7M)
b) Define the acceptance angle and Numerical aperture of an optical fiber and derive expressions for acceptance angle and numerical aperture. (7M)

Code No: R18A0261

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021

Basic Electrical and Electronics Engineering

(ME & AE)

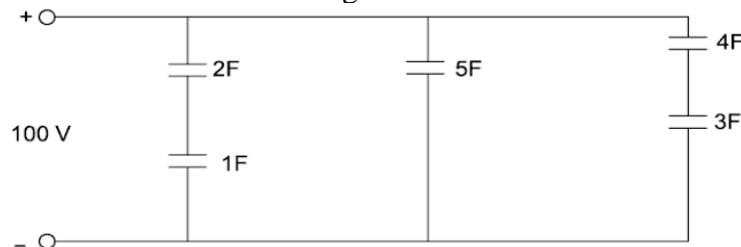
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Time: 2 hours 30 min

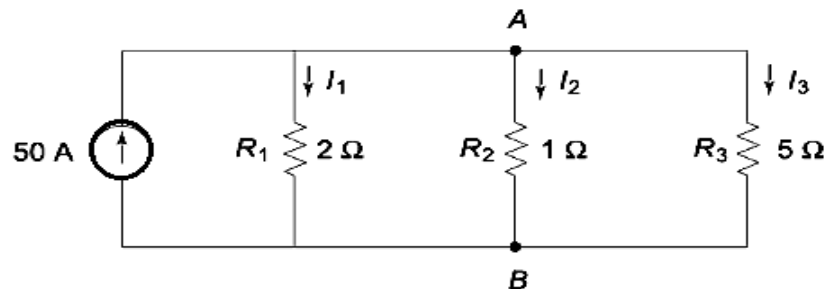
Max. Marks: 70

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

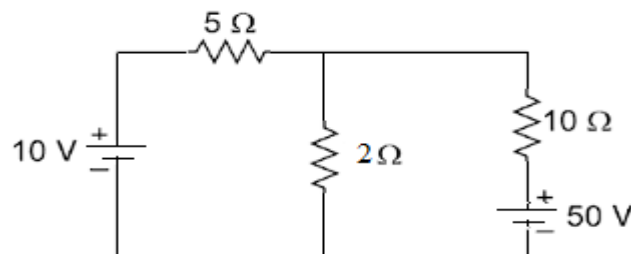
- 1(a)** Summarize the active and passive elements with an example. [7M]
- (b)** Find the total equivalent capacitance and total energy stored if the applied voltage is 100V for the circuit shown in the fig. [7M]



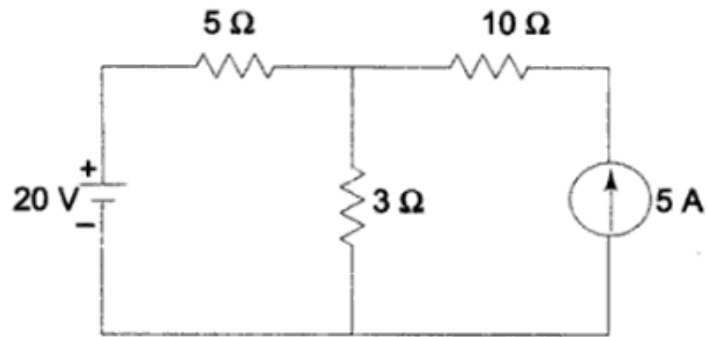
- 2(a)** Derive voltage, current and power relations in R & L elements. [7M]
- (b)** Determine the current in all resistors in the circuit using KCL. [7M]



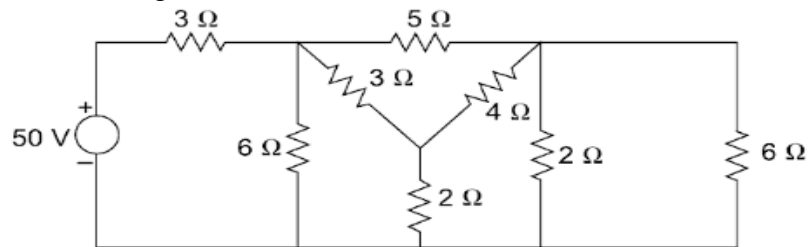
- 3(a)** Write the mesh equations and determine the currents in the circuit shown in the fig. [7M]



- (b)** Find the current through 3Ω resistor using superposition theorem in the circuit [7M]



- 4(a) Illustrate the source transformation technique with an example. [7M]
- (b) Using star- delta transformation, determine the current drawn by the source in the circuit shown in the fig. [7M]



- 5(a) Develop the emf equation of a D.C Generator [7M]
- (b) Summarize the concept of “back emf” used in DC motors. [7M]
- 6(a) Describe the constructional features of 1-phase transformer [7M]
- (b) Illustrate the complete classification of D.C Generators [7M]
- 7(a) Describe the operation of full wave rectifier with the help of circuit diagram and waveforms. [7M]
- (b) A full wave rectifier $V_i=100 \sin\omega t$, $R_L=900$ ohms . $R_F = 100$ ohms. Calculate (i) Input AC Power (ii) DC Output Power (iii) Rectifier Efficiency (iv) Ripple Factor (v) TUF [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]

Code No: R18A0013

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021**Engineering Chemistry****(ME & AE)**

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Time: 2 hours 30 min**Max. Marks: 70**

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

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| 1 | a) State Nernst equation and write any three applications of it. | (7M) |
| | b) Explain the functioning of H ₂ -O ₂ fuel cell with neat diagram and reactions involved in it. | (7M) |
| 2 | a) Write in detail mechanism involved in electrochemical corrosion. | (7M) |
| | b) Write a note on sacrificial anode protection and cathodic protection method of controlling corrosion. | (7M) |
| 3 | a) Draw the molecular orbital diagram of O ₂ and based on it comment on magnetic and spin only properties of the O ₂ molecule. | (10M) |
| | b) State salient features of CFT | (4M) |
| 4 | a) Discuss the postulates of molecular orbital theory. | (7M) |
| | b) Explain Crystal field splitting of transition metal ion d-orbitals in octahedral geometry. | (7M) |
| 5 | a) Explain the procedure involved in softening of Hardwater by ion exchange method. | (10M) (4M) |
| | b) Write a short note on desalination of water by Reverse Osmosis. | |
| 6 | a) What is potable water? Describe the treatment of water for drinking. | (7M) |
| | b) Explain estimation of hardness of water by EDTA method | (7M) |
| 7 | a) What is nucleophilic substitution? Explain the S _N ¹ mechanism with suitable Example. | (7M) |
| | a) Explain the reduction of carbonyl compounds by using LiAlH ₄ and NaBH ₄ with suitable mechanism. | (7M) |
| 8 | a) Explain in detail Proximate analysis of coal and its significance. | (7M) |
| | b) Write in detail gasoline preparation by fluid bed catalytic cracking process | (7M) |

Code No: **R18A0301****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021**Engineering Graphics****(EEE, ECE, CSE & IT)**

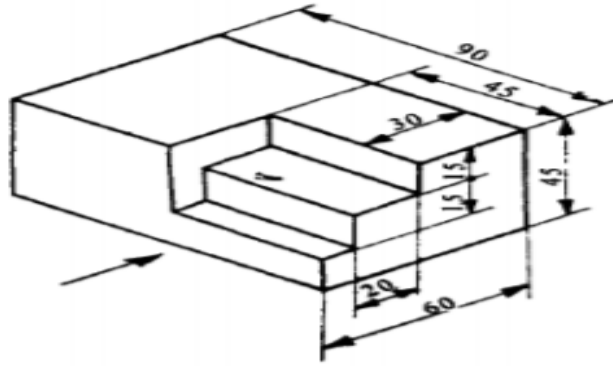
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Time: 2 hours 30 min**Max. Marks: 70**

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

NOTE: All dimensions are in mm

- 1 a) Construct regular polygon of 6 sides, with the length of the side as 25, by general method? [6M]
b) Construct a diagonal scale of $R.F=1/(2.5 \times 10^6)$ to read upto a single kilometer and long enough to measure 400 km. Mark a length of 254 km on it ? [8M]
- 2 Construct an ellipse, with the distance of the focus from the directrix as 50 mm and eccentricity as $2/3$. Also, draw normal and tangent to the curve, at a point 40 mm from the directrix? [14M]
- 3 A point A is 15 above H.P and 20 in front of V.P. Another point B is 25 behind V.P and 40 below H.P. Draw the projections of A and B, keeping the distance between the projectors equal to 90. Draw straight lines, joining (i) the top views and (ii) the front views. [14M]
- 4 A line AB of 70 long, has its end A at 10 above H.P and 15 in front of V.P. Its front view and top view measure 50 and 60 respectively. Draw the projections of the line and determine its inclinations with H.P and V.P. [14M]
- 5 A rectangle ABCD of size 40 x 25 , has the corner A, 10 above H.P and 15 in front of V.P. All the sides of the rectangle are equally inclined to H.P and parallel to V.P. Draw its projections. [14M]
- 6 A pentagonal pyramid of base 25 side and axis 60 long, is resting on an edge of the base on H.P. Draw the projections of the pyramid, when its axis is perpendicular to V.P and the base is at 15 from V.P. [14M]
- 7 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 H.P, with an edge of the base parallel to V.P. use the off –set method. [14M]
- 8 Draw Front View, Top view and Side view for the figure shown below. All dimensions are in mm. [14M]



Code No: R18A0021

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021

Mathematics-I

(EEE, ME, ECE, CSE, IT & AE)

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Time: 2 hours 30 min

Max. Marks: 70

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

- 1 a) Show that $\begin{bmatrix} 3 & 7-4i & -2+5i \\ 7+4i & -2 & 3+i \\ -2-5i & 3-i & 4 \end{bmatrix}$ is a Hermitian matrix [6M]
- b) Verify Cayley-Hamilton theorem for the matrix A and find its inverse [8M]
- $$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$
- 2 Find the eigen values and the eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ [14M]
- 3 a) Prove that $u = x + y + z$, $v = xy + yz + xz$, $w = x^2 + y^2 + z^2$ are functional dependent and find the relation between them [7M]
- b) A rectangular box open at a top is to have volume of 32 *cube ft*. Find the dimensions of the box requiring least material for its construction [7M]
- 4 a) Find the maximum value of $x^2 + y^2 + z^2$ given $x + y + z = 3a$ [7M]
- b) Show that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube [7M]
- 5 a) Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$ [7M]
- b) Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$ [7M]
- 6 a) Solve $(x^2 + y^2 + 2x)dx + 2ydy = 0$ [7M]
- b) Solve $\frac{d^2y}{dx^2} + a^2y = \cos ec ax$ by the method of variation of parameters [7M]
- 7 a) Solve: $p^2 + q^2 = x + y$ [6M]

- b) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ [8M]
where $u(x, 0) = 6e^{-3x}$

- 8 a) Find the Laplace transform of $\cos 2t + \sin 3t$ [6M]

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

Code No: **R18A0501****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**

(Autonomous Institution – UGC, Govt. of India)

I B.Tech I Semester Supplementary Examinations, February 2021**Programming for Problem Solving**

(EEE, ME, ECE, CSE, IT & AE)

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Time: 2 hours 30 min**Max. Marks: 70**

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

- 1 a) Build an algorithm, flowchart and C program to find the sum of numbers from 1 to 'n' [8M]
[6M]
b) Describe various types of computers.
- 2 a) Identify the formatted input and output functions and explain with examples. [8M]
[6M]
b) Write a C program in C to find the area and perimeter of a circle and triangle.
- 3 a) Construct a C program to find the reverse of an integer number and check whether it is palindrome or not. [8M]
[6M]
b) Show how break and continue statements are used in a C program, with example.
- 4 Differentiate while & do...while statements. Explain the syntax of do-while statement. Write a C program to find the factorial of a number using while loop, where the number n is entered by the user. [14M]
(Hint: factorial of $n = 1*2*3*....*n$).
- 5 a) Write a program to illustrate call by value and call by reference techniques. [8M]
[6M]
b) Discover the different categories of functions and discuss it.
- 6 Elucidate the importance of various storage classes with necessary examples. [14M]
- 7 Write user defined functions to perform the following string operations [14M]
(i) Find the length of the string
(ii) Concatenate two strings
(iii) Copy one string from the other
- 8 a) Develop a program to read and display information [rollno, name, fees, DOB (dateofbirth)] of all students in the class. [8M]
[6M]
b) Write a short note on Structure with in a structure.
