Hall Ticket Number :

R-17

Code: **7GC14**

I B.Tech. I Semester Supplementary Examinations August 2021
Engineering Mathematics-I
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)
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UNIT–I

1. a) Find the solutions of the system of equations: x+2y-z=0, 2x+y+z=0, x-4y+5z=0   7M

    b) Prove that if λ is an eigen value of a non-singular matrix A corresponding to the eigen
        vector X then λ^{-1} is an eigen value of A^{-1} and corresponding eigen vector X itself.   7M

OR

2. a) Solve the equations x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0   7M

    b) Find the eigen values and eigen vectors of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

UNIT–II

3. a) Define a model matrix, Diagonalize the Matrix A= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ 7M

    b) Show that A = $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is a skew-Hermitian matrix and also unitary matrix   7M

OR

4.   Reduce the quadratic form $-3x_1^2 - 3x_2^2 - 3x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3$ to the canonical form.
        Find Index and Signature.   14M

UNIT–III

5. a) Solve $(1+y^2) + (x - e^{\tan^{-1} y})\dfrac{dy}{dx} = 0$ 7M

    b) If 30% of a radioactive substance disappears in 10 days, how long will it take for 90% of it to
        disappear?   7M

OR

6. a) Solve $\dfrac{dy}{dx} + y \tan x = y^2 \sec x$ 7M

    b) Find the Orthogonal Trajectories of the family of curves $x^2 + y^2 = a^2$ 7M

UNIT–IV

7. a) Solve $(D^2 + 1)y = \sin x \sin 2x + e^x x^2$ 7M

    b) Solve $\dfrac{d^2 y}{dx^2} + y = \cos ec\ x$ by the method of variation of parameters.   7M

OR

8. a) Solve by the method of variation of parameters $\dfrac{d^2 y}{dx^2} - 2\dfrac{dy}{dx} = e^x \sin x$ 7M

    b) Solve $(D+2)(D-1)^2 y = e^{-2x} + 2\sinh x$ 7M

UNIT–V

9. a) If $x = r\sin\theta\ \cos w$, $y = r\sin\theta\ \sin w$, $z = r\cos\theta$, Show that $\dfrac{\partial(x, y, z)}{\partial(r, \theta, w)} = r^2 \sin\theta$ 7M

    b) Find the maxima and minima of $z = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$ 7M

OR

10.   A rectangular box open at the top is to have volume of 32 cubic ft. find the dimensions of the
        box requiring least material for its construction.   14M

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R-17

Code: 7GC13

I B.Tech. I Semester Supplementary Examinations August 2021
Engineering Physics
(Common to EEE & ECE)

Max. Marks: 70   Time: 3 Hours
Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)
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UNIT–I

1. a) Write the characteristics of grating spectrum   7M
    b) Derive the relation between Einstein's coefficients.   7M

OR

2. a) Analyze the working function of different parts in optical fiber communication system.   9M
    b) An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the acceptance angle for the fiber in water which has the refractive index of 1.33.   5M

UNIT–II

3. a) Derive the expression for inter planar spacing.   7M
    b) Classify the crystal systems into 7 types based on lattice parameters.   7M

OR

4. a) Explain the construction and working of piezo electric method for production of ultrasonics with neat diagram.   7M
    b) Describe Non Destructive Testing of materials.   7M

UNIT–III

5. a) Explain the classification of solids on the basis of energy band theory   7M
    b) Describe Fermi-Dirac distribution function   7M

OR

6. a) Find de-Broglie wave length of an electron accelerated in field of potential 1600V   7M
    b) Derive 1-D Schrödinger wave equation   7M

UNIT–IV

7. a) Describe drift and diffussion currents in a semiconductor. Derive their expressions.   7M
    b) Derive the equation of continuity equation for electrons.   7M

OR

8. a) Explain hysteresis of a ferromagnetic materials.   7M
    b) Explain the classification of magnetic materials.   7M

UNIT–V

9. a) Describe BCS theory of superconductivity.   7M
    b) Write applications of superconductors.   7M

OR

10. a) Explain the basic principles of nanomaterials.   7M
    b) Write the applications of nanomaterials.   7M

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Code: 7G311

I B.Tech. I Semester Supplementary Examinations August 2021

Fundamentals of Electrical & Electronics Engineering

(Common to EEE & ECE)

Max. Marks: 70   Time: 3 Hours

Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. What are the types of resistors? Explain any three with neat diagrams.   14M

OR

2. Explain the following with neat diagrams
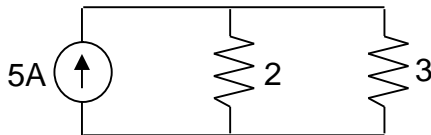   a) Fixed value resistors   b) Fixed value capacitors   14M

UNIT–II

3. a) Find voltage across 5 , 6   resisters using voltage division rule for the circuit given below
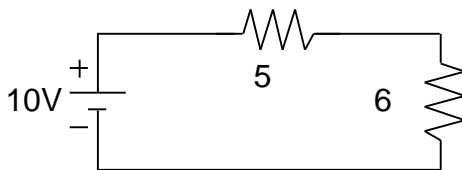
7M

   b) Find the current through 2 , 3   resisters using current division rule.

7M

OR

4. a) State and explain Kirchhoff's laws.   7M
    b) Differentiate series and parallel circuit   7M

UNIT–III

5. a) Discuss the effect of temperature on characteristics of PN junction diode.   7M
    b) The voltage across a silicon diode at room temperature of 300°K is 0.62V when 2mA current flows through it. If the voltage increases to 0.80V, calculate the new diode current.   7M

OR

6. a) Explain V-I characteristics of PN junction diode.   7M
    b) Explain how zener diode act as voltage regulator.   7M

UNIT–IV

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

OR

8. With neat sketch explain the operation of full wave rectifier with capacitor filter and derive the expression for ripple factor.   14M

UNIT–V

9. a) Derive the relation between ,   and   7M
    b) Compare CB, CE configurations of a transistor.   7M

OR

10. a) Draw and explain the input and output characteristics of transistor in CE configuration.   7M
    b) Compare various transistor configurations.   7M

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Code: 7G111

I B.Tech. I Semester Supplementary Examinations August 2021

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) Describe computer hardware and computer software. 7M

   b) Define Algorithm. Write an Algorithm to read 20 numbers and print their sum. 7M

OR

2. a) Discuss briefly about computer languages. 7M

   b) Explain the software development method in detail. 7M

UNIT–II

3. a) Describe structure of C program with suitable example. 7M

   b) Write a program to find out total and average of three subject marks. 7M

OR

4. a) What is conditional operator? Write a program to enter two numbers and find the smallest out of them. Use conditional operator. 7M

   b) Explain in detail about C data types. 7M

UNIT–III

5. a) With Examples, explain while, do while and for loops 6M

   b) Write a program to find out whether the given number is perfect number or not. 8M

OR

6. Write a program to generate prime numbers between 1 and 1000. (use break statement to reduce number of iterations) 14M

UNIT–IV

7. a) What is an array? How is one dimensional array declared and initialized? 7M

   b) Write a program to find the sum of all elements in an array. 7M

OR

8. a) Discuss all string handling functions in C Language. 7M

   b) Write a program to find whether a given string is palindrome or not. 7M

UNIT–V

9. Explain different storage classes with examples 14M

OR

10. a) Explain the differences between call by value and call by reference with examples. 8M

    b) What is recursive function? Write a program to find factorial of integer value using recursive function. 6M

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