II B.Tech. I Semester Supplementary Examinations November 2023
Analog Electronics - I
(Electrical and Electronics Engineering)

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. Draw and discuss the Frequency response of RC Coupled, Direct coupled and Transformer coupled amplifiers with relevant diagrams. | 14M

OR

2. a) Distinguish between Exact and approximate models of BJT using h-parameters. | 5M
   b) State and prove millers theorem. Explain its significance in transistor circuit analysis. | 9M

UNIT–II

3. a) Derive the expression for transfer gain with feedback? | 7M
   b) What is Sampling. Explain about it with neat diagrams. | 7M

OR

4. a) An amplifier has an open loop gain 1000 and a feedback ratio of 0.04. if the open loop gain changed by 10% due to temperature, then find the percentage change in gain of the amplifier with feedback. | 7M
   b) Derive the expressions for input impedance, output impedance for current series feedback. | 7M

UNIT–III

5. a) Explain about the crystal oscillators and mention their advantages | 7M
   b) Write short notes on Frequency stability of oscillators | 7M

OR

6. a) Discuss about Hartley oscillator with the help of circuit diagram. | 10M
   b) Determine the Resistance of RC phase shift oscillator for operation at fo= 10 KHz, K=45 and C= 2pF. | 4M

UNIT–IV

7. a) Write short notes on Class-A direct coupled Class-A power amplifier. | 7M
   b) Explain class A power amplifier working with neat sketches and derive the expression for conversion efficiency. | 7M

OR

8. a) Derive the expression for efficiency in class B amplifier | 7M
   b) What is the Max power dissipation per each transistor and derive the expression for it. | 7M

UNIT–V

9. a) What is RC low-pass circuit? What is meant by ringing circuit? | 7M
   b) Explain the RC Integrator with Exponential input. | 7M

OR

10. a) Discuss about transistor clippers. | 7M
    b) State and prove clamping circuit theorem. | 7M

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Code: 7GC32

R-17

II B.Tech. I Semester Supplementary Examinations November 2023
Engineering Mathematics-III
(Common to All Branches)

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Marks

UNIT–I

1. a) Find the real root of equation $x^3 - x - 11 = 0$ by bisection method.   7M

    b) Using Taylor's series method, compute the value of y at x=0.2 from $\frac{dy}{dx} = x + y$;

    $y(0) = 1$.   7M

OR

2. Using R-K method of 4th order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, $y(0) = 1$. Find $y(0.2), y(0.4)$.

    14M

UNIT–II

3. a) Find the first and second derivatives of the function tabulated below at the point x = 1.5

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

    7M

    b) Evaluate f(10) given f(x) = 168, 192, 336 at x = 1, 7, 15 respectively. Use Lagrange
       interpolation.   7M

OR

4. A solid of revolution is formed by rotating about the x-axis, the area between the
    x-axis, the lines x=0 and x=1 and a curve through the points with the following
    co-ordinates:

x	0.00	0.25	0.5	0.75	1.00
y	1.0000	0.9896	0.9589	0.9089	0.8415

    Estimate the volume of the soli formed using Simpsons rule.   7M

UNIT–III

5. a) Form the partial differential equation by eliminating the arbitrary constants

    $x^2 + y^2 + (z - c)^2 = a^2$ 7M

    b) Fit a second degree parabola to the following data by the method of least squares

x	10	12	15	23	20
y	14	17	23	25	21

    7M

OR

6. a) Fit a straight line $y = a + b\,x$ to the data by the method of least squares

x	0	1	3	6	8
y	1	3	2	5	4

    7M

    b) Form the partial differential equation by eliminating a, b from $z = a\,x + b\,y + a^2 + b^2$ 7M

UNIT–IV

7. a) Find the Fourier series expansion for $f(x) = f - x$ in $0 < x < 2f$ 7M

   b) Expand $f(x) = \cos x, 0 < x < f$ in half range sine series.   7M

OR

8.   Express $f(x) = x$ as half range sine and cosine in $0 < x < 2$ 14M

UNIT–V

9. a) Find the Fourier sin and cosine transform of $f(x) = \dfrac{e^{-ax}}{x}, a > 0$ 7M

   b) Find the Fourier cosine transform of $f(x) = e^{-ax}(x > 0, a > 0)$.   7M

OR

10.   Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2, & |x| \leq 1 \\ 0, & |x| \geq 1 \end{cases}$.

   Hence evaluate $\displaystyle\int_0^\infty \dfrac{x\cos x - \sin x}{x^3} \cos\dfrac{x}{2}\, dx$ 14M

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