CODE: 2205ES03 | R22 | SET - 1

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution – UGC, Govt. of India)

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Accredited by NBA & NAAC – 'A' Grade

NIRF India Ranking, Accepted by MHRD, Govt. of India

B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB-2024
COMPUTER ORGANIZATION AND OPERATING SYSTEMS
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	State the use of address bus	1M	BTL2
	B	Mention the purpose of instruction cycle	1M	BTL2
	C	What does addressing mode mean?	1M	BTL1
	D	Name the two types of RAM	1M	BTL1
	E	Indicate whether a CPU ad monitor are connected parallel or serially	1M	BTL2
	F	Present the function of USB in two points	1M	BTL2
	G	Define demand paging	1M	BTL2
	H	Give the meaning of deadlock	1M	BTL2
	I	Represent the benefit of DMA	1M	BTL2
	J	Write the micro operation to show addition of two registers and storing sum in any one the registers	1M	BTL2

PART – B

(5 x 10 = 50M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Feature the functional units of a basic computer	5M	BTL 2
2.B	Deliver a note on memory- reference instructions	5M	BTL2

(OR)

3.A	Emphasize on Logic and Shift micro operations	5M	BTL 2
3.B	Depict the instruction cycle flow diagram	5M	BTL2

SECTION - II

4.A	Highlight the memory operations in cache and virtual memories	5M	BTL2
4.B	Focus on the presentation of Control memory functions	5M	BTL2

(OR)

5.A	Illustrate the micro programmed control unit with a design	5M	BTL2
5.B	Explain the various memories and their specialties	5M	BTL2

CODE: 2205ES03 | **R22** | **SET - 1**

SECTION - III

6.A	Analyze the priority interrupt procedures in I-O processing	5M	BTL4
6.B	Justify the types of data transfer modes in I-O processing	5M	BTL4

(OR)

7.A	Interpret the peripheral interface and their interconnection	5M	BTL4
7.B	Compare the Standard Serial communication protocols	5M	BTL4

SECTION – IV

8.A	Determine the various processes and their states	5M	BTL2
8.B	Detail the styles of various memory management schemes	5M	BTL2

(OR)

9.A	Conceptualize the Process Management and Scheduling	5M	BTL2
9.B	Elaborate the memory page replacement algorithms	5M	BTL2

SECTION – V

10.A	Using an example of data file sharing, justify the deadlock avoidance	5M	BTL4
10.B	Interpret the directory structure and issues in it	5M	BTL4

(OR)

11.A	Contrast the terms detection, prevention, avoidance processes in deadlock management	5M	BTL4
11.B	Specify the analysis carried out in file system interface	5M	BTL4

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CODE: 2204PC02 | R22 | SET - 3

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National Ranking by NIRF - Rank band (151-300), MHRD, Govt. of India

B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB-2024

ELECTRONIC DEVICES AND CIRCUITS

(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	Draw PN Junction diode characteristic curve	1M	BTL2
	B	What are the applications of varactor diode?	1M	BTL2
	C	What is diffusion capacitance?	1M	BTL2
	D	What is difference between rectifier and regulator?	1M	BTL1
	E	Define ripple factor	1M	BTL2
	F	What is meant by operating point Q in BJT.	1M	BTL2
	G	Why biasing is necessary in BJT amplifier.	1M	BTL2
	H	Why FET is called as voltage operated device.	1M	BTL2
	I	What is Zener breakdown	1M	BTL2
	J	What is the effect of temperature on the forward bias current in the diode.	1M	BTL2

PART – B **(5 x 10 = 50M)**

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Discuss PN diode V-I characteristics with neat sketch -- 4 Marks	5M	BTL2
2.B	Calculate the factor by which the current will increase in a silicon diode operating at forward voltage of 0.4 V when the temperature is raised from 25^0 to 150^0 C -- 6 Marks	5M	BTL5

(OR)

3.A	Explain with a neat sketch, the principal of operation of Tunnel diode with the help of energy band diagrams	5M	BTL2
3.B	Draw the diode equivalent circuit. Explain about the breakdown mechanisms in semiconductor diodes.	5M	BTL3

CODE: 2204PC02 | **R22** | **SET - 3**

SECTION - II

4.A	With a circuit and necessary diagram explain the operation of Center tapped FWR.	5M	BTL2
4.B	Derive the expression for the ripple factor for the FWR	5M	BTL5

(OR)

5.A	What is a regulator? Design a voltage regulator by using the Zenor diode and explain about the operation with necessary diagrams.	5M	BTL2
5.B	What is the need for the filter in rectifiers? Compare various filters which can be used.	5M	BTL2

SECTION - III

6.A	With a neat diagram explain how the transistor works as an Amplifier. Also give the DC load line analysis.	5M	BTL4
6.B	For a BJT calculate the β and α, if base current is 20 micro amps and collector current is 5 mA.	5M	BTL5

(OR)

7.A	Give the h-parameter representation of BJT. Give the analysis of single stage transistor amplifier using h-parameters.	7M	BTL4
7.B	Explain about the input characteristics of BJT.	3M	BTL2

SECTION – IV

8.A	What is the need for biasing? Explain about Fixed bias.	5M	BTL2
8.B	Define thermal run away. Explain about the various conditions for thermal run away.	5M	BTL2

(OR)

9.A	Explain about various self-biasing techniques for stabilization.	5M	BTL2
9.B	Explain about DC and AC load lines with necessary equations and diagram	5M	BTL3

SECTION – V

10.A	Give the comparison between BJT and JFET. An n-channel depletion type MOSFET has I_{DSS} = 10 mA. And V_P = -2V. Determine actual value of drain to source resistance when V_{GS} = 1 V and 2 V	6M	BTL5
10.B	Explain about the working of JFET and draw its characteristic curves.	4M	BTL2

(OR)

11.A	Explain about the characteristics in Enhancement mode and depletion mode	5M	BTL3
11.B	Draw the small signal model of JFET and explain about it.	5M	BTL2

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CODE: 1804PC01 | R18 | SET - 2

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B.TECH II YEAR I SEMESTER SUPPLY EXAMINATIONS, JAN/FEB-2024
ELECTRONIC DEVICES AND CIRCUITS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

[Time: 3 Hours] **[Max. Marks: 70]**

PART – A

(5 x 2 = 10M)

Note: 1. This Part consists of 8 QUESTIONS
2. Answer any 5 questions. Each question carries 2 Marks.

1	A	Define Doping.	2M	BTL1
	B	Draw the VI Characteristics of a PN Junction Diode	2M	BTL2
	C	What are the advantages of Bridge Rectifier?	2M	BTL1
	D	What is reverse saturation current?	2M	BTL1
	E	Define the various h-parameters in a transistor	2M	BTL1
	F	Define thermal runaway.	2M	BTL1
	G	Why FET is preferred in a Buffer Amplifier?	2M	BTL2
	H	What are the applications of MOSFET?	2M	BTL1

PART – B

(5 x 12 = 60M)

Note: 1. ThisPart consists of 10 QUESTIONS
2. Answer any 1 question from each Section.Each question carries 12Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.	Explain the construction and operation of PN Junction Diode under both forward and reverse biasing with neat diagrams	12M	BTL4

(OR)

3.A	Explain the construction and operation of Tunnel Diode	6M	BTL2
3.B	Explain the construction and operation of Varactor Diode	6M	BTL3

SECTION - II

4.	Describe the construction, working principle of full wave rectifier and derive the expressions for the ripple factor, efficiency, VDC, IRMS and VRMS.	12M	BTL4

(OR)

5.A	Explain avalanche breakdown and Zener breakdown	6M	BTL2
5.B	Explain the operation of voltage regulator using Zener Diode.	6M	BTL3

SECTION - III

6.	Draw and explain the input and output characteristics of a transistor in CE and CB configurations	12M	BTL4

(OR)

7.	Derive the expression for Ai, Av, Ri and Ro for CE and CB amplifier using h-parameter model.	12M	BTL5

SECTION – IV

8.A	Explain fixed basing and mention its advantages and disadvantages.	9M	BTL2
8.B	What is the need for bias stability?	3M	BTL3

(OR)

9.A	Explain with neat diagram the operation of voltage divider biasing of a transistor.	9M	BTL2
9.B	Explain the condition for thermal stability	3M	BTL3

SECTION – V

10.A	Explain with the help of neat diagrams the structure of N-channel FET and its VI characteristics.	9M	BTL2
10.B	Differentiate between BJT and FET.	3M	BTL3

(OR)

11.A	Compare JFET and MOSFET.	3M	BTL5
11.B	Draw and explain the small signal model of a common drain amplifier with necessary parameters.	9M	BTL4

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CODE: 2000BS03 | **R20** | **SET - 1**

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B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB -2024
MATHEMATICS - III
(COMMON TO ECE & EEE)

[Time: 3 Hours] **[Max. Marks: 70]**

PART – A

(5 x 2 = 10M)

Note: 1. This Part consists of 8 QUESTIONS
2. Answer any 5 questions. Each question carries 2 Marks.

1	A	State Cauchy-Riemann equations in a Cartesian coordinates.	2M	BTL2
	B	Show that z^2 is an analytic for all z.	2M	BT L3
	C	Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along the line $y=\frac{x}{2}$.	2M	BT L3
	D	Evaluate $\int_C \frac{z^2+4}{z-3}dz$, where C is $\lvert z\rvert=5$.	2M	BT L3
	E	Calculate the residue of $\frac{3z+1}{(z+1)(2z-1)}$ at $z=\frac{1}{2}$.	2M	BT L2
	F	Find the Fourier coefficient a_0 for the given function $f(x)=e^x$ in the interval $0<x<2\pi$	2M	BT L1
	G	Find the Z-transform of $\sin(3n+5)$.	2M	BT L1
	H	Find the Z-transform of $e^t \sin 2t$.	2M	BT L1

PART – B

(5 x 12 = 60M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 12Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	If f(z) is an analytic function with constant modulus, show that f(z) is constant.	6 M	BTL2
2.B	Show that the polar form of Cauchy-Riemann equations are $\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial \theta}, \frac{\partial v}{\partial r}=-\frac{1}{r}\frac{\partial u}{\partial \theta}$.	6 M	BTL3

(OR)

3.A	If f(z) is a holomorphic function of z, show that $\left\{\frac{\partial}{\partial x}\lvert f(z)\rvert\right\}^2+\left\{\frac{\partial}{\partial y}\lvert f(z)\rvert\right\}^2=\lvert f'(z)\rvert$.	6 M	BTL3
3.B	Construct the analytic function, whose real part is $\frac{\sin 2x}{(\cosh 2y-\cos 2x)}$.	6 M	BTL3

SECTION - II

4.A	Solve $\int_{1-i}^{2+i}(2x+iy+1)dz$, along the path (i) $x=t+1, y=2t^2-1$	6 M	BTL3

	(ii) the straight line joining $1-i$ *and* $2+i$.		
4.B	Verify Cauchy's theorem for the integral z^3 take over the boundary ofthe rectangle with vertices $-1,1,1+i,-1+i$.	6 M	BTL4

(OR)

5.A	State and prove Cauchy's integral formula.	6 M	BTL3
5.B	Expand the Laurent's expansion of $f(z)=\dfrac{7z-2}{(z+1)z(z-2)}$ in the region $1<z+1<3$.	6 M	BTL4

SECTION - III

6.A	Determine the poles of the function $f(z)=\dfrac{z^2-2z}{(z+1)^2(z^2+1)}$ and also calculate residues at each pole.	6 M	BTL5
6.B	Evaluate $\oint_C \dfrac{e^z}{\cos \pi z}dz$, where C is the unit circle $\lvert z\rvert=1$.	6 M	BTL4

(OR)

7.	Apply calculus of residues, to prove that $\int_0^{2\pi} \dfrac{d\theta}{1-2r\cos\theta+r^2}=\dfrac{\pi}{1-r^2}$.	12 M	BTL5

SECTION – IV

8.A	Express the function $f(x)=\lvert x\rvert$ as a Fourier series in the interval $\pi<x<\pi$.	6 M	BTL4
8.B	Find the half-range cosine series for the function $f(x)=x^2$ in the range $0\le x\le \pi$.	6 M	BTL2

(OR)

9.	Obtain the Fourier series for the function $f(x)=\begin{cases}\pi x, & 0\le x\le 1\\ \pi(2-x), & 1\le x\le 2\end{cases}$. Deduce that $\dfrac{1}{1^2}+\dfrac{1}{3^2}+\dfrac{1}{5^2}+\dfrac{1}{7^2}+\ldots\ldots=\dfrac{\pi^2}{8}$.	12 M	BTL3

SECTION – V

10.A	Express the function $f(x)=\begin{cases}1\ for\ \lvert x\rvert\le 1\\ 0\ for\ \lvert x>1\rvert\end{cases}$ as a Fourier integral. Hence evaluate $\int_0^{\infty}\dfrac{\sin\lambda\cos\lambda x}{\lambda}d\lambda$.	6 M	BTL4
10.B	Find the Fourier sine transform of $e^{-\lvert x\rvert}$. Hence show that $\int_0^{\infty}\dfrac{x\sin mx}{1+x^2}dx=\dfrac{\pi e^{-m}}{2}, m>0$.	6 M	BTL2

(OR)

11.A	If $U(Z)=\dfrac{2z^2+5z+14}{(z-1)^4}$, evaluate u_2 *and* u_3.	6 M	BTL4
11.B	Solve $y_{n+2}+6y_{n+1}+9y_n=2^n$ with $y_0=y_1=0$,using Z-transform.	6 M	BTL3

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CODE: 2000BS03 | R20 | SET-3

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B.TECH II YEAR I SEMESTER SUPPLY EXAMINATIONS, FEBRUARY -2024

MATHEMATICS-III

(COMMON TO ECE,EEE)

[Time: 3 Hours] **[Max. Marks: 70]**

PART – A

(5 x 2 = 10M)

Note: 1. This Part consists of 8 QUESTIONS
2. Answer any 5 questions. Each question carries 2 Marks.

1	A	Check whether $w = \bar{z}$ is analytic everywhere.	2M	BTL2
	B	Show that an analytic function with constant real part is constant.	2M	BTL3
	C	Find the harmonic conjugate of the function $u(x, y) = 2x(1-y)$	2M	BTL2
	D	Find the poles of the function $f(z) = \dfrac{z^2}{(z-1)^2(z+2)}$	2M	BTL2
	E	If $f(x)=x^3, -\pi < x < \pi$, find the constant term a_o of its Fourier series.	2M	BTL3
	F	Prove that $F[f(x-a)] = e^{ias}F(s)$.	2M	BTL3
	G	State Dirichlet's conditions to expand a given function in Fourier series.	2M	BTL2
	H	Prove that $F\{f(ax)\} = \dfrac{1}{a}F\left[\dfrac{s}{a}\right], a > 0.$	2M	BTL3

PART – B

(5 x 12 = 60M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section.Each question carries 12Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Verify if $f(z) = \dfrac{xy^2(x+iy)}{x^2+y^4}$, $z \neq 0$; $f(0) = 0$ is analytic or not.	6M	BTL3
2.B	Evaluate the regular function whose imaginary part is $e^x \sin y$	6M	BTL5

(OR)

3.A	Verify whether $f(z) = \log z$ is analytic	6M	BTL3
3.B	Find the conjugate harmonic function of $u(x, y) = 3x^2y + 2x^2 - y^3 - 2y^2$ and express $u + iv$ as an analytic function of z	6M	BTL5

SECTION - II

4.A	Using Cauchy's integral formula, evaluate $\int_c \dfrac{z}{(z+1)^2(z+3)}dz$, where C is the Circle $\lvert z+1 \rvert = 1$.	6M	BTL3
4.B	Find the Taylor's series to represent $\dfrac{z^2-1}{(z+2)(z+3)}$ in $\lvert z \rvert < 2$.	6M	BTL5

(OR)

5.A	Evaluate f(2) and f(3) where $f(a)=\oint_C \frac{2z^2-z-2}{z-a}dz$ and $C:\lvert z\rvert=2.5$	6M	BTL3
5.B	Expand $f(z)=\frac{z^2-1}{(z+2)(z+3)}$ in Taylor's series if $\lvert z\rvert<2$.	6M	BTL5

SECTION - III

6.A	Evaluate $\int \frac{\sin \pi z^2+\cos \pi z^2}{(z-1)^2(z-2)}dz$ around $\lvert z\rvert=3$	6M	BTL3
6.B	Using the method of contour integration, show that $\int_0^{2\pi}\frac{d\theta}{5+4\sin\theta}=\frac{2\pi}{3}$.	6M	BTL5

(OR)

7.A	Evaluate $\oint_C \frac{1}{\left(z^2+4\right)^2}dz$, $C:\lvert z-i\rvert=2$	6M	BTL3
7.B	By contour integration, evaluate $\int_{-\infty}^{\infty}\frac{dx}{(x^2+1)(x^2+4)}$	6M	BTL5

SECTION – IV

8.	Obtain the Fourier series of $f(x)=\begin{cases}x, & 0<x<\pi\\ 2\pi-x, & \pi<x<2\pi\end{cases}$.	12M	BTL3

(OR)

9.A	Find the Fourier series for $f(x)=x^2$ in $(-\pi,\pi)$.	6M	BTL3
9.B	Find the half-range cosine series for $f(x)=\cos\alpha x$ for α, not an integer in the range $0<x<\pi$	6M	BTL5

SECTION – V

10.A	Find the Fourier transform of $f(x)$ given by $f(x)=\begin{cases}1;\ for\ \lvert x\rvert<2\\ 0;\ for\ \lvert x\rvert>2\end{cases}$ and hence evaluate $\int_0^{\infty}\frac{\sin x}{x}dx$	6M	BTL3
10.B	Find the Z-transform of $\frac{1}{n}$ and $\cos\left(\frac{n\pi}{2}\right)$	6M	BTL5

(OR)

11.A	Applying convolution theorem, find $Z^{-1}\left(\frac{z^2}{(z-4)(z-5)}\right)$	6M	BTL3
11.B	Solve the difference equation $y(k+2)+y(k)=1,\ y(0)=1\ and\ y(1)=0.$	6M	BTL5

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CODE: 2204PC04 | R22 | SET - 2

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B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB-2024
NETWORK ANALYSIS
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	Define resonance in an RLC circuit.	1M	BTL2
	B	Illustrate the significance of a tie set matrix in circuit analysis.	1M	BTL4
	C	Discuss the significance of damping factor in second-order systems?	1M	BTL3
	D	Define quality factor (Q) for resonance.	1M	BTL2
	E	Explain the impulse response of a network. How is it related to the Laplace transform?	1M	BTL2
	F	Illustrate the transfer function of a network.	1M	BTL4
	G	Explain the significance of the h-parameters in a two-port network.	1M	BTL2
	H	Define the terms "driving point function" and "transfer function" in network theory.	1M	BTL2
	I	Illustrate the Foster's Reactance theorem.	1M	BTL4
	J	Illustrate the significance of LC networks in filter design?	1M	BTL4

PART – B

(5 x 10 = 50M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Illustrate the significance of transforming a magnetically coupled circuit into an equivalent T-network.	5M	BTL4
2.B	Two coils, Coil-1 and Coil-2, have mutual inductance (M) of 0.05 H. A current of 2 A flows through Coil 1. Calculate the induced voltage in Coil	5M	BTL5

(OR)

3.A	Define an ideal transformer and list its characteristics.	5M	BTL2
3.B	For an ideal transformer with a turn's ratio of 1:8, if the primary winding draws a current of 2A at $120V_{rms}$ and the secondary has a load of 32Ω: a. Calculate the current flowing through the secondary winding. b. Determine the power delivered to the load.	5M	BTL5

SECTION - II

4.A	Illustrate the characteristics of second order RLC circuits	5M	BTL4
4.B	Determine the resonance frequency, bandwidth, and quality factor for a series RLC circuit with R = 100 Ω, L = 0.2 H, and C = 50 μF.	5M	BTL5

(OR)

5.A	Explain the concept of a second-order system step response. Demonstrate how the system parameters affect the response?	5M	BTL2
5.B	Solve the step response of a second-order system described by the	5M	BTL5

	transfer function $G(s) = \frac{1}{(s^2+4s+5)}$		

SECTION - III

6.A	For the given network function, draw the pole-zero diagram and hence obtain the time response I(t). $I(s) = \frac{5s}{(s+1)(s^2+4s+8)}$	5M	BTL5
6.B	(i) Write the characteristics of test signals and draw its waveform. (ii) Find poles and zeroes of following transfer function: $Z(s) = \frac{(s+1)}{(s^2+2s+2)}$	5M	BTL5

(OR)

7.A	Using convolution theorem, Find inverse LT of: $\frac{a}{(s^2+a^2)^2}$	5M	BTL3
7.B	Apply Laplace transform to solve the differential equation of an RC circuit with initial conditions.	5M	BTL4

SECTION – IV

8.A	For a transmission line with a characteristic impedance of 50 ohms, calculate the image transfer constant when terminated with a load impedance of 75 ohms.	5M	BTL4
8.B	Determine the network function for a two-port network described by the ABCD parameters:A = 1.5, B = 2, C=0.5, D=3.	5M	BTL4

(OR)

9.A	Given a transfer function $H(s) = \frac{s+2}{s^2+3s+5}$, find the poles and zeros of the system.	5M	BTL4
9.B	For a two-port network with the following scattering (S) parameters: $S = \begin{bmatrix} 0.2 & 0.4 \\ 0.3 & 0.5 \end{bmatrix}$ Calculate the iterative impedance seen looking into port 1 when port 2 is terminated with a load impedance of 50 ohms.	5M	BTL5

SECTION – V

10.A	Design a T-type attenuator with resistor values of R1 = 100 ohms, R2 = 150 ohms, and R3 = 100 ohms. Achieve an attenuation of 10 dB. Calculate the output voltage for an input voltage of 1 V.	6M	BTL4
10.B	Explain the design procedure and the role of each component.	4M	BTL2

(OR)

11.A	Design a composite filter by combining a second-order low-pass filter with a cutoff frequency of 500 Hz and a second-order high-pass filter with a cutoff frequency of 1 kHz. Use standard capacitor and inductor values. Simulate the response of the composite filter for a square wave input with a frequency of 750 Hz.	6M	BTL5
11.B	Discuss the advantages and limitations of the composite filter.	4M	BTL3

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CODE: 2004PC03 | R20 | SET - 2

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B.TECH II YEAR I SEMESTER SUPPLY EXAMINATIONS, JAN/FEB-2024
NETWORK ANALYSIS
(ECE)

[Time: 3 Hours] **[Max. Marks: 70]**

PART – A

(5*2 = 10M)

Note: 1. This Part consists of 8 QUESTIONS
2. Answer **ANY 5 Questions**. Each question carries 2 Marks.

1	A	Define resonance in an RLC circuit.	2M	BTL2
	B	Illustrate the significance of a tie set matrix in circuit analysis.	2M	BTL4
	C	Discuss the significance of damping factor in second-order systems?	2M	BTL3
	D	Define quality factor (Q) for resonance.	2M	BTL2
	E	Explain the impulse response of a network. How is it related to the Laplace transform?	2M	BTL2
	F	Illustrate the transfer function of a network.	2M	BTL4
	G	Explain the significance of the h-parameters in a two-port network.	2M	BTL2
	H	Define the terms "driving point function" and "transfer function" in network theory.	2M	BTL2

PART – B

(5 x 12= 60M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 12Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Illustrate the significance of transforming a magnetically coupled circuit into an equivalent T-network.	6M	BTL4
2.B	Two coils, Coil-1 and Coil-2, have mutual inductance (M) of 0.05 H. A current of 2 A flows through Coil 1. Calculate the induced voltage in Coil	6M	BTL5

(OR)

3.A	Define an ideal transformer and list its characteristics.	6M	BTL2
3.B	For an ideal transformer with a turn's ratio of 1:8, if the primary winding draws a current of 2A at $120V_{rms}$ and the secondary has a load of 32Ω: a. Calculate the current flowing through the secondary winding. b. Determine the power delivered to the load.	6M	BTL5

SECTION - II

4.A	Illustrate the characteristics of second order RLC circuits	6M	BTL4
4.B	Determine the resonance frequency, bandwidth, and quality factor for a series RLC circuit with R = 100 Ω, L = 0.2 H, and C = 50 µF.	6M	BTL5

(OR)

5.A	Explain the concept of a second-order system step response. Demonstrate how the system parameters affect the response?	6M	BTL2
5.B	Solve the step response of a second-order system described by the transfer function $G(s) = \frac{1}{(s^2+4s+5)}$	6M	BTL5

CODE: 2004PC03 | **R20** | **SET - 2**

SECTION - III

6.A	For the given network function, draw the pole-zero diagram and hence obtain the time response I(t). $I(s) = \frac{5s}{(s+1)(s^2+4s+8)}$	6M	BTL5
6.B	(i) Write the characteristics of test signals and draw its waveform. (ii) Find poles and zeroes of following transfer function: $Z(s) = \frac{(s+1)}{(s^2+2s+2)}$	6M	BTL5

(OR)

7.A	Using convolution theorem, Find inverse LT of: $\frac{a}{(s^2+a^2)^2}$	6M	BTL3
7.B	Apply Laplace transform to solve the differential equation of an RC circuit with initial conditions.	6M	BTL4

SECTION – IV

8.A	For a transmission line with a characteristic impedance of 50 ohms, calculate the image transfer constant when terminated with a load impedance of 75 ohms.	6M	BTL4
8.B	Determine the network function for a two-port network described by the ABCD parameters:A = 1.5, B = 2, C=0.5, D=3.	6M	BTL4

(OR)

9.A	Given a transfer function $H(s) = \frac{s+2}{s^2+3s+5}$, find the poles and zeros of the system.	6M	BTL4
9.B	For a two-port network with the following scattering (S) parameters: $S = \begin{bmatrix} 0.2 & 0.4 \\ 0.3 & 0.5 \end{bmatrix}$ Calculate the iterative impedance seen looking into port 1 when port 2 is terminated with a load impedance of 50 ohms.	6M	BTL5

SECTION – V

10.A	Design a T-type attenuator with resistor values of R1 = 100 ohms, R2 = 150 ohms, and R3 = 100 ohms. Achieve an attenuation of 10 dB. Calculate the output voltage for an input voltage of 1 V.	8M	BTL4
10.B	Explain the design procedure and the role of each component.	4M	BTL2

(OR)

11.A	Design a composite filter by combining a second-order low-pass filter with a cutoff frequency of 500 Hz and a second-order high-pass filter with a cutoff frequency of 1 kHz. Use standard capacitor and inductor values. Simulate the response of the composite filter for a square wave input with a frequency of 750 Hz.	8M	BTL5
11.B	Discuss the advantages and limitations of the composite filter.	4M	BTL3

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CODE: 2204PC01 | R22 | SET - 3

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
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B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB -2024
PROBABILITY THEORY AND STOCHASTIC PROCESS
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. ThisPart consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1Mark.

1.	A	When two dice are thrown, find the probability of getting sum of 10.	1M	BTL2
	B	What are the conditions for a function to be a random variable.	1M	BTL1
	C	Define Cumulative distribution function.	1M	BTL1
	D	Define Moment generating function.	1M	BTL1
	E	State any two properties of joint distribution function.	1M	BTL2
	F	Define the expected value of a function of two random variables.	1M	BTL1
	G	Define a random process.	1M	BTL1
	H	What is an LTI System.	1M	BTL1
	I	Define Power spectral density.	1M	BTL1
	J	Mention any two properties of cross power spectral density.	1M	BTL2

PART – B

(5 x 10 = 50M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Define Joint probability and Conditional probability.	5M	BTL1
2.B	A single card is drawn from a 52-card deck. (i) What is the probability that the card is a jack? (ii) What is the probability that the card is red 10?	5M	BTL3

(OR)

3.A	Explain the classification of random variables with examples.	5M	BTL2
3.B	Two boxes are selected randomly. The first box contains 2 white balls and 3 black balls. The second box contains 3 white and 4 black balls. What is the probability of drawing a white ball?	5M	BTL5

SECTION - II

4.A	Define and explain the Gaussian random variable in brief.	5M	BTL2
4.B	A random variable X has a probability density function $f_X(x) = \begin{cases} C(1-x^2), & -1 \le x \le 1 \\ 0, & otherwise \end{cases}$	5M	BTL3

	(i) Find C (ii) Find P$\left[\lvert x\rvert < \frac{1}{2}\right]$		

(OR)

5.A	Explain the following (i) Expectation (ii) Variance (ii) Skew	5M	BTL2
5.B	The probabilities of a random variable X are given as When $x_1 = \frac{1}{2}, P(x_1) = \frac{1}{2}$ and $x_2 = -\frac{1}{2}, P(x_1) = \frac{1}{2}$. Find the moment generating function and the first four moments.	5M	BTL5

SECTION – III

6.A	Define and explain joint distribution function and joint density function of two random variables X and Y.	5M	BTL2
6.B	State and explain about central Limit theorem.	5M	BTL2

(OR)

7.A	Describe about joint characteristic function and mention its properties.	5M	BTL2
7.B	Two random variables X and Y have the joint characteristic function $\emptyset_{X,Y}(x,y) = \exp(-2\omega_1^2 - 8\omega_2^2)$ Show that X and Y are zero mean random variables.	5M	BTL5

SECTION – IV

8.A	Explain how random processes are classified with neat sketches.	5M	BTL4
8.B	A stationary random process has an autocorrelation function given by $R(\tau) = \frac{25\tau^2 + 36}{6.25\tau^2 + 4}$ Find the mean value, mean square value and variance of the process.	5M	BTL3

(OR)

9.A	Derive the mean and mean square value of a system response to a input random process of an LTI System.	5M	BTL3
9.B	A random process $X(t)$ is applied as input to a system whose impulse response is $h(t) = 3\,u(t)t^2exp(-8t)$.If $E[X(t)] = 2$,what is the mean value of the system response $y(t)$.	5M	BTL3

SECTION – V

10.A	State and Prove the Wiener-Khintchin relations.	5M	BTL5
10.B	The cross power spectral density is given as $S_{XY}(\omega) = \frac{1}{(a+j\omega)^2}$, where $a > 0$,a is a constant Find the cross-correlation function.	5M	BTL3

(OR)

11.A	Derive the relation between the PSD of the input and the output random process of an LTI System.	5M	BTL3
11.B	A random process $X(t)$whose mean value is 2 and autocorrelation function is $R_{XX}(\tau) = 4e^{-2\lvert\tau\rvert}$ is applied to a system whose transfer function $\frac{1}{2+j\omega}$ .Find the mean value, autocorrelation, power density spectrum and average power of the output signal $Y(t)$.	5M	BTL3

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CODE: 2204PC03 | R22 | SET - 3

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B.TECH II YEAR I SEMESTER REGULAR EXAMINATIONS, JAN/FEB-2024
SIGNALS & SYSTEMS
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A **(10x 1 = 10M)**

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	Define deterministic and random signals.	1M	BTL1
	B	Define an impulse function and plot δ(t+2) – δ (t-3).	1M	BTL2
	C	The Fourier Transform of real valued signal has Symmetry.	1M	BTL1
	D	Define Nyquist rate and Nyquist interval.	1M	BTL1
	E	A Low-pass filter circuit has a cut-off frequency of 1.23 kHz. The bandwidth of the filter is	1M	BTL2
	F	For providing a Roll-off greater than 20dB/decade/pole, filters with which characteristics are useful?	1M	BTL3
	G	Given f (t) = t^2e^{-2x} cos (3t). The value of L {f(t)} is	1M	BTL2
	H	The Laplace transform of signal u(t-2) is	1M	BTL2
	I	The z-transform of δ[n+k]>0 is	1M	BTL1
	J	When do DTFT and ZT are equal?	1M	BTL1

PART – B **(5 x 10 = 50M)**

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Determine whether the following signals are energy signals or power signals andcalculate their energy or power. i)$x(t) = rect\left(\frac{t}{\tau}\right) sinw_o(t)$ ii)$x(t) = Ae^{-at}u(t), a > 0$	5M	BTL3
2.B	Sketch the following signals. (i)$u(t) + u(t-2)$ii)$\sin(wt)\, u(t-1)u(9-t)$	5M	BTL3

(OR)

3.A	Sketch the following signal and perform any four basic operations on it. $x(t) = 2u(t+2) - 2u(t-3)$	5M	BTL3
3.B	Determine whether the following discrete time signals are periodic or not? (i) $x(n) = sin\frac{2\pi n}{3} + cos\frac{2\pi n}{5}$ (ii) $x(n) = e^{j(\frac{\pi}{2})n}$	5M	BTL4

SECTION - II

4.A	Using Fourier transform find the convolution of the following signals. $x_1(t) = e^{-t}u(t)$ $x_2(t) = e^{-3t}u(t)$	5M	BTL3
4.B	Determine the Nyquist sampling rate and Nyquist interval for the following signals. (i) $x(t) = 2sinc(100\pi t)$ (ii) $x(t) = 1 + \cos(2000\pi t) + \cos(4000\pi t)$	5M	BTL4

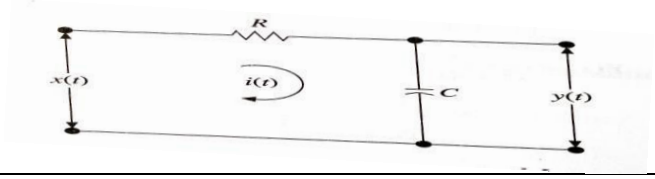
(OR)

5.A	Find the inverse Fourier transform of the following. $X(w) = \frac{jw}{(3+jw)^2}$	5M	BTL3
5.B	Explain Zero Order hold method of data reconstruction.	5M	BTL2

SECTION - III

6.A	Define signal bandwidth, system bandwidth. Explain about ideal filter characteristics.	5M	BTL2
6.B	Find the convolution of the following signals by graphical method. $x(t) = e^{-3t}u(t)\,; h(t) = u(t+3)$	5M	BTL4

(OR)

7.A	A signal $x(t) = e^{2t}u(t)$ is passed through an ideal lowpass filter with cut off frequency of 1 rad/sec. (i) Test whether the input is an energy signal. (ii) Find the input and output energy.	5M	BTL3
7.B	Find the output voltage of the RC low pass filter shown below for input voltage of $x(t) = te^{-t/RC}$. 	5M	BTL5

SECTION – IV

8.A	Compare Laplace transform and Fourier Transform. State and prove the following properties of Laplace transform. (i) Time scaling (ii) Transform of derivatives (iii)Perceval'sTheorem	5M	BTL3
8.B	Find Laplace transform and ROC of the following signals. (i) Complex exponential function (ii) Unit ramp function	5M	BTL3

(OR)

9.A	What is the condition for existence of Laplace transform? State the properties of ROC.	5M	BTL2
9.B	Find the inverse Laplace transform of $X(s) = \frac{1}{(s+1)(s+2)(s+3)}$ if the region of convergence is , Re(s) > - 1.	5M	BTL4

SECTION – V

10.A	Distinguish between one-sided and two sided z-transforms and its region of convergence, also explain the properties of ROC of Z-transform	5M	BTL3
10.B	Find the inverse Z-transform of $X(z) = \frac{z(z-1)}{(z+1)^3(z+2)}$; ROC :$\|z\| > 2$.	5M	BTL3

(OR)

11.A	Find the inverse z- transform of $X(z) = \frac{z}{(z+2)(z+3)}$, when the ROC is i) ROC: $\|z\| < 2$ ii) ROC: $2 < \|z\| < 3$	5M	BTL3
11.B	State and prove time shifting and time convolution properties of Z- transform.	5M	BTL2

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