CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech IV Sem Supplementary Examinations January-2025**
Course Name : **Analog & Digital Communications**
Course Code : **A404304**
Branch : **Electronics & Communication Engineering**
Date & Session : **07-01-2025 AN**   Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   **10x1=10M**

1.	What is the need for modulation?	1 M
2.	Draw the Phasor representation of an AM Wave?	1 M
3.	Define frequency deviation?	1 M
4.	What are the salient features of Phase modulation?	1 M
5.	Define selectivity of AM receiver?	1 M
6.	Identify the purpose of limiter in an FM receiver?	1 M
7.	Discuss the main features of Delta Modulation?	1 M
8.	How can the Quantization error can be reduced?	1 M
9.	Define ISI?	1 M
10.	How is eye pattern obtained on the CRO?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). The carrier frequency for AM modulator is 500khz. The maximum modulating signal is 1kHz. Find i) The upper and lower sideband ii) the bandwidth iii) If the modulating signal frequency is 1500kHz, Find the lower and upper sideband frequencies iv) Draw the output frequency spectrum for f_m=1kHz.   10M

OR

11. B). With the help of block diagram explain the production of SSB SC and compare with the VSB SC.   10M

12. A). Demonstrate the detection of FM using Phase Locked Loop (PLL).   10M

OR

12. B). With a neat block diagram explain the Armstrong method of FM generation.   10M

13. A). Implement the following: 10M
    i) List the Advantages and disadvantages of TRF receiver?
    ii) Discuss in detail about pre-emphasis and de-emphasis in FM.

OR

13. B). Draw the block diagram of superheterodyne radio receiver and explain the function of each block.   10M

(P.T.O..)

14. A). Explain the Operation of DPCM techniques. List the advantages and disadvantages of it.   10M

OR

14. B). Explain Delta modulation with block diagram and discuss different types of noise effects in Delta modulation.   10M

15. A). What are different digital modulation techniques available? Compare them with regard to the probability error.   10M

OR

15. B). Explain generation and detection of coherent binary PSK and differential phase shift keying signals.   10M

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Examination	:	B.Tech IV Sem Supplementary Examinations January-2025
Course Name	:	Electromagnetic fields and Transmission Lines
Course Code	:	A404306
Branch	:	Electronics & Communication Engineering
Date & Session	:	09-01-2025 AN　　Duration: 3 hours　　Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.　　　　10x1=10M

1. What is the unit of volume charge density?　　1 M
2. What is the Electric field Intensity due to surface charge density.　　1 M
3. What is the Units of Magnetic Flux Density?　　1 M
4. Relation between direction of magnetic force and direction of velocity of charged particle.　　1 M
5. Define Faraday's law.　　1 M
6. What is first Maxwell equation?　　1 M
7. What is the intrinsic impedance in free space?　　1 M
8. Write the equation for Phase constant in free space.　　1 M
9. What is lossless line　　1 M
10. Obtain the relation for Reflection co-efficient in terms of Z_L and Z_o.　　1 M

PART-B
Answer the following. Each question carries TEN Marks.　　　　5x10=50M

11.A). i) State and explain Coulomb's law using vector form of Coulomb's force expression.　　5M
　　　ii) Find the force on a charge of -100mC located at P (2, 0, 5) in free space due to another charge 300μ C located at Q (1, 2, 3).　　5M

OR

11. B). Define and distinguish between the terms electric field, electric displacement, electric flux density and derive mathematical relations.　　10M

12. A). What is amperes force law and derive force between two current elements.　　10M

OR

12. B). Develop an expression for the magnetic field intensity using Biot savart's law.　　10M

13. A). Derive the boundary conditions for the tangential components of Electrostatic fields at the boundary between two perfect dielectrics.　　10M

OR

13. B). i) Define maxwells equations in word statements and give differential & integral form.　　5M
　　　ii) Derive expression for Poynting theorem.　　5M

(P.T.O..)

14. A). Derive the relation E/H= ή for uniform plane wave.   10M

OR

14. B). Derive expression for Reflection coefficient of an EM wave when it is incident obliquely on a dielectric.   10M

15. A). i) Derive the expression for single stub matching.   7M
       ii) Write a detailed notes on Smith chart and its applications.   3M

OR

15. B). Derive transmission line equations.   10M

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Examination	:	B.Tech IV Sem Supplementary Examinations January-2025
Course Name	:	Linear and Digital IC Applications
Course Code	:	A404307
Branch	:	Electronics & Communication Engineering
Date & Session	:	10-01-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1. Define CMRR of op-amp.   1 M
2. Define input offset voltage.   1 M
3. Define lock range in PLL.   1 M
4. Why active filters are preferred.   1 M
5. Name the different DAC techniques.   1 M
6. Define Resolution of ADC.   1 M
7. Write the examples of Combinational Circuits.   1 M
8. Define Binary Comparator.   1 M
9. Classify types of ROMs.   1 M
10. Draw the Excitation Table of SR.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). What is an Instrumentation amplifier? Explain the working of instrumentation amplifier   10M
        with neat circuit diagram.

OR

11. B). Explain the internal structure of voltage regulator IC 723. Also draw a voltage Regulator   10M
         circuit using IC 723 and explain its operation.

12. A). Draw the block diagram of monostable multivibrator using 555 timer and derive an   10M
         expression for its pulse width.

OR

12. B). Explain working of PLL using appropriate block diagram.   10M

13. A). i) With a neat diagram, explain the working principle of R-2R ladder type DAC.   5M
         ii) Write the specifications of DAC.   5M

OR

13. B). Explain the operation of parallel comparator type ADC.   10M

14. A). Design 3 to 8 decoder and explain its operation.   10M

OR

14. B). Design 2 bit Magnitude Comparator.   10M

15. A). i) Design a Modulo-10 Synchronous counter using any flip flop.   5M
         ii) Write the differences between synchronous and asynchronous counters.   5M

OR

15. B). Discuss in detail ROM access mechanism with the help of timing waveforms.   10M

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Examination : **B.Tech IV Sem Supplementary Examinations January-2025**
Course Name : **Electronics Devices and Circuits**
Course Code : **A404203S**
Branch : **Electronics & Communication Engineering**
Date & Session : **17-01-2025 AN**   Duration: 3 hours   Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   **10x1=10M**

1.	What is a diode?	1 M
2.	List two types of capacitance in diodes.	1 M
3.	What is a half-wave rectifier?	1 M
4.	Draw the clipper circuit.	1 M
5.	State the function of a transistor.	1 M
6.	Name the configurations of Bipolar Junction Transistor (BJT).	1 M
7.	What does FET stand for?	1 M
8.	Define MOSFET in simple terms.	1 M
9.	What is the use of a Zener diode?	1 M
10.	List one application of an LED.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). A diode has a forward voltage of 0.7V and dynamic resistance of 5Ω. Calculate the current flowing through the diode if a 5V source is applied across it.   10M

OR

11. B). Explain the VI characteristics of a diode with the help of a diagram, including both forward and reverse bias regions.   10M

12. A). Describe the working of a full-wave rectifier with a capacitor filter.   10M

OR

12. B). Explain clamping operation and types of clampers.   10M

13. A). Discuss the principle of operation of a Bipolar Junction Transistor with it's types   10M

OR

13. B). Compare common base and common collector configurations.   10M

14. A). i) Develop input and output characteristics of transistor in CC configuration.   5M
ii) Formulate the relationship between α, β and γ.   5M

OR

14. B). Build a circuit for obtaining of Drain and Transfer characteristics of an N-Channel JFET.   10M

15. A). i) Analyze the how Zener diode is used as voltage regulator?   5M
ii) Compare avalanche and Zener diode break down.   5M

OR

15. B). Explain the principle of operation of a photodiode and LED.   10M

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Examination : **B.Tech IV Sem Supplementary Examinations Jan-2025**
Course Name : **Electronic Circuit Analysis**
Course Code : **A404308**
Branch : **ECE**
Date & Session : **25-01-2025 FN** Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark. 10x1=10M

1.	Compare the efficiency of Class A and Class B power amplifier	1 M
2.	Why h-parameters are not used for analysis of power amplifiers	1 M
3.	Define unloaded and loaded Q of tuned circuit.	1 M
4.	List the advantages of tuned amplifiers	1 M
5.	Calculate time period of astable mutli if R_1=1KΩ, C_1=10μF R_2=2KΩ C_2=20μF	1 M
6.	What are different types of triggering?	1 M
7.	Define slope error?	1 M
8.	What are different types of time-based generators available	1 M
9.	Draw the circuit diagram of monostable relaxation circuit	1 M
10.	What are the advantages of synchronization circuits	1 M

PART-B
Answer any FIVE questions. One question from each unit either A or B (Compulsory)
Each question carries TEN Marks. 5x10=50M

11. A.	Show that in push pull stage distortion decreases	10M

OR

11. B.	Show that the maximum efficiency of Class-A power amplifier is 50%	10M
12. A.	Explain the operation of Single stage tuned amplifiers and also its resonance frequency	10M

OR

12. B.	Define Q factor. With the help of circuit diagram explain about double tuned amplifier circuit.	10M
13. A.	With the help of neat sketch explain the operation of mono stable multi and derive the expression for pulse width	10M

OR

13. B.	With the help of neat sketch explain the operation of astable multi and derive the expression for time period of generated square wave	10M

(P.T.O.)

14. A. Derive the following expressions for   10M
       a) Sweep speed error   b) Displacement error   c) Transmission error

<div align="center">OR</div>

14. B. Find the component values of a bootstrap sweep generator, Given $V_{CC} = 20$ 10M
       V, I_C(sat) = 3 mA and hfe (min) = 50.

15. A. Why the sampling gates are called linear gates and compare unidirectional   10M
       and bidirectional sampling gates.

<div align="center">OR</div>

15. B. With the help of neat diagram explain the working of a six-diode gate?   10M

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Examination	:	B.Tech IV Sem Supplementary Examinations January-2025
Course Name	:	Switching Theory & Logic Design
Course Code	:	EEE-A404205/ ECE-A404305
Branch	:	EEE/ ECE
Date & Session	:	27-01-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What do the extreme right and left digits in a number indicate?	1 M
2.	What is the minimum distance of a 7-bit Hamming code?	1 M
3.	How many cells an n variable K-map can have?	1 M
4.	What is an encoder?	1 M
5.	How many flip flops are required for storing n bits of information?	1 M
6.	What are the applications of flip flops?	1 M
7.	What do you mean by serial data transfer?	1 M
8.	What are the advantages of ripple counter?	1 M
9.	What is strongly connected machine?	1 M
10.	What are the limitations of finite state machines?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A).	Subtract the following decimal numbers by the 9's and 10's compliment methods i)315-96 ii)96-618 iii)574.6-279.7	10M
	OR	
11. B).	Express the following functions as sum of minterms and product of maxterms: $$F(A,B,C,D) = \bar{B}D + \bar{A}D + BD$$	10M
12. A).	Reduce the following expression using K map and implement them using universal gate. $F = \sum m(0,1,4,5,6,7,9,11,15) + d(10,14)$	10M
	OR	
12. B).	Implement the given logic expression using 4:1 MUX and 8:1 MUX $F = \sum m(0,2,4,7)$	10M
13. A).	Draw the circuit diagram of a positive edge triggered JK flip flop and explain its operation with the help of a truth table. How is the race around condition eliminated?	10M
	OR	
13. B).	Convert the J-k flip flop into: i)SR FF ii)D FF	10M
14. A).	Design a multi mode universal shift registers of 4 bit.	10M
	OR	
14. B).	What do you mean by a parity bit generator? Explain its working with the help of a state diagram to generate odd parity?	10M

(P.T.O..)

15. A).   Write short notes on state equivalence and machine minimization.   10M

OR

15. B).   What is merger table method? Explain with suitable example.   10M

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Examination	:	B.Tech IV Sem Supplementary Examinations January-2025	
Course Name	:	Signals & Systems	
Course Code	:	ECE-A404303	
Branch	:	ECE	
Date & Session	:	27-01-2025 FN Duration: 3 hours	Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What do you understand by orthogonal Vector space?	1 M
2.	Define Mean Square Error.	1 M
3.	Define even and odd symmetry in Fourier series.	1 M
4.	State Parseval's Energy theorem of Fourier Transform.	1 M
5.	Define Frequency response of an LTI System	1 M
6.	What is Signal Bandwidth?	1 M
7.	Define Region of Convergence of step signal using Laplace Transform.	1 M
8.	State linearity property of Z-transform.	1 M
9.	What is Nyquist interval of the signal $x(t) = 10 \sin(1000\pi t) - 20 \cos(2000\pi t)$	1 M
10.	What is Power Spectral Density?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11. A. A rectangular function x(t) is defined by   10M

$$x(t) = \begin{cases} 1 & \text{for } 0 < t < \pi \\ -1 & \text{for } \pi < t < 2\pi \end{cases}$$

Approximate the above rectangular function by a single sinusoid
sin t over the interval $[0,2\pi]$ such that Mean Square Error is minimum. Evaluate the mean square error in this approximation.

OR

11. B. Examine whether the following signals are periodic or not. If periodic determine the   10M
period.
(i) $x(t) = \text{Sin } 10\pi t + \text{Cos } 20\pi t$
(ii) $x(t) = u(t) - 2 u(t-4)$
(iii) $x(n) = \cos (\pi/2 + 0.3n)$

12. A. State the Dirichlet's conditions for existence of Fourier Transforms. Prove that the   10M
Fourier Transform of a train of impulses is also a train of impulses.

OR

12. B. State and prove the time shifting property of Fourier Series. And also compute the   10M
Fourier series of the signal $x(t) = e^{-t}$ with T=1 sec and x(t) signal is repetitive for every
one second.

(P.T.O)

13. A. The impulse response of a system is $h(t) = e^{-2t} u(t)$ and the input to the system is $x(t) = e^{-4t} [u(t) - u(t-3)]$. Determine the output response of the system using Graphical interpretation of Convolution.   10M

<div align="center">OR</div>

13. B. Let the system function of an LTI System be $H(\Omega) = \frac{1}{1+j\Omega}$. determine the output response for an input $x(t) = (0.8)^t u(t)$ 10M

14. A. State and prove initial value theorem and final value theorem of Laplace Transforms. Find initial and final values of the following Laplace functions.   10M

$$(a)\ X(s) = \frac{s+4}{s^2+3s+5} \qquad\qquad (b)X(s) = \frac{s^2+3s+6}{s^2+2s+3}$$

<div align="center">OR</div>

14. B. Find the Z-Transform of the sequence   10M

$$x(n) = \left(\frac{1}{2}\right)^n \cos\left(\frac{\pi}{3}n\right) u(n)$$ Also sketch the ROC and pole-zero location.

15. A. Explain Flat top Sampling technique with neat circuit diagram and necessary waveforms. And also discuss the aperture effect.   10M

<div align="center">OR</div>

15. B. Sate and prove the properties of Energy Spectral Density(ESD). And also prove that autocorrelation function and ESD will form a Fourier Transform pair.   10M

<div align="center">*****</div>