Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-5301 ELECTROMAGNETIC WAVES

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Diffrentiate between characteristic impendance and line impedance. **07**

(b) In a lossless transmission line, the velocity of propagation is 2.5×10^8 m/sec. Capacitance of the line is 30 pF/ m. Find: **07**
(i) Inductance of the line (ii) Phase Constant at 100 MHz
(iii) Characteristic impedance of the line.

2(a) An Ideal lossless transmission line of Z_o = 60 Ω is connected to unknown Z_L. If SWR = 4, find Z_L, reflection co-efficient, transmission co-efficient. **07**

(b) State and explain the boundary conditions for electric fields at an interface between two dielectrics. **07**

3(a) Find exponential for potential difference in terms of a applied potential. **07**
Given V = $\begin{cases} V_o \text{ at } r = a \\ 0 \text{ at } r = b \end{cases}$

(b) Discuss the basic laws of electromagnetics in detail. **07**

4(a) A 160 MHz plane wave penetrates through A1 of S = 10^5 mho s/m, $\varepsilon_2 = \mu_r = 1$. Calculate skin depth and also depth at which the wave amplitude decreases to 13.5 % of its initiate value.

(b) Discuss the wave propagation in conducting media. **07**

5(a) Determine the ratio of free space wave length to wave length in a conductor with $\sigma = 10^5$ mho /m, μ_r = 5 at 10 kHz. **07**

(b) State and prove Poynting theorem. Also give the physical interpretation of $\vec{E}$ and $\vec{H}$. **07**

6(a) Discuss the reflection of plane waves at the interface of conductor.
(i) oblique incidence (ii) normal incidence **07**

(b) A plane wave propagating in free space with a peak electric field of intensity 750 mV/ meter. Find the average power through the square area of 120cm on a side perpendicular to the direction of propagation. **07**

7(a) How the electromagnetic waves propagate through wave guide? **07**

(b) Derive the expression for ($\propto_{mn}$) in case of TE and TM waves in rectangular wave guide. **07**

8 Write a short note on any two : **14**
(i) Maxwell's Equations. (ii) Simith Chart
(iii) Phase and Group Velocity (iv) Field Visualization.

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-5302 PRINCIPLES OF DIGITAL COMMUNICATION

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks. Data to be provided in the exam hall.

1(a) A random variable X has uniform PDF in the range [-2, 2]. Determine mean and variance of the random variable. ***07***

(b) Define the following terms : (i) Probability Density Function (pdf) ***07***
(ii) Cumulative Distribution Function (cdf)

2(a) Evaluate the mean and variance of the sum of random variable if ***07***
(i) Z = X + Y (ii) Either E(X) = 0 or E(Y) = 0

(b) Describe the working and principle of Frequency Division Multiplexing (FDM) system with drawing wave form. ***07***

3(a) A TDM-PAM system uses flat-top sampling pulses 0.7 micro seconds wide. If a guard time of 0.34 micro seconds is allowed and N = 120 telephone messages are multiplexed. ***07***
(i) What is the minimum sampling rate?
(ii) What channel Bandwidth is required?

(b) What is the aliasing effect and how can be removed? ***07***

4(a) Given an audio signal as : $x(t) = 3\cos(1500\pi t)$. ***07***
(i) Evaluate SNR when this is quantized using 10-bit PCM.
(ii) How many bits of quantization are needed to achieve a SNR of at least 40 dB.
(iii) Data rate and bandwidth in PCM system for 80 multiplexed channel.

(b) Draw the block diagram of PCM system and explain its working. ***07***

5(a) If voice frequency signal is sampled at the rate of 32000 samples/sec and characterized by peak value of 2V. Evaluate the value of step size to avoid slope overload. What is quantization noise power and corresponding SNR? Assume bandwidth of signal as 4KHz. ***07***

(b) Compare in between the BASK, BPSK and BFSK on the basis of probability of error. ***07***

6(a) Describe the generation and reception of BPSK (Binary Phase Shift Keying) with help of block diagram. ***07***

(b) Plot BASK, BFSK and BPSK waveform for the bit stream 00110101. ***07***

7(a) Describe the Performance Analysis of non-coherent communication. ***07***

(b) Binary data is transmitted over a band pass channel at a rate of 300 bit per second using non-coherent FSK signaling scheme with tone frequency 1070 and 1270 Hz. Evaluate the probability of error assuming $A^2 / N_0 = 8000$. ***07***

8 Write a note on **any two** : ***14***
(i) Random Signal and Random Variable (ii) Types of Pulse Modulation
(iii) SNR in PCM system (iv) QAM system

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

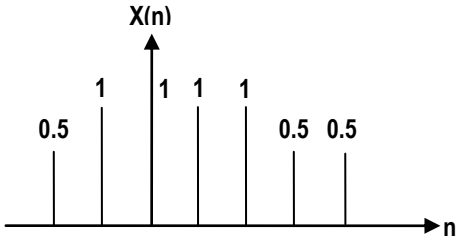
EC-5303 DIGITAL SIGNAL PROCESSING

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) What do you mean by signal processing? Give the classification of signals.

(b) A discrete time signal x(n) = { 0.5, 1,1, 1,1,0.5, 0.5 } sketch each of following signal.



(i) x(-n+2) (ii) x(n-2) (iii) x(2n) u(n-2)

2(a) Determine whether or not the following system are linear, time variant and casual.

(i) y(n) = n x(n) (ii) $y(n) = x(n^2)$ (iii) $y(n) = e^{x(n)}$

(b) Determine impulse response h(n) for system describe by second order differential equation with initial condition y(-1) = 1.

$$y(n) - 2y(n-1) = x(n) + x(n+1)$$

3(a) Derive the expression for Z-Transform. Write properties of region of convergence (ROC) for Z-Transform.

(b) Determine the Z-Transform and draw ROC of given sequence.

$$x(n) = -a^n u(-n-1)$$

4(a) Explain various propertie's of DFT in brief.

(b) Perform circular convolution of following two sequence :

$$x_1(n) = \{2,1,2,1\} \quad \text{and} \quad x_2(n) = \{1,2,3,4\}$$

5(a) Explain window technique for designing FIR digital filter.

(b) Describe the design of IIR filter by bilinear transformation.

6(a) Differentiate between FIR filter and IIR filter.

(b) Determine IDFT of sequence X(k) = {2, 1+j, 0, 1-j}

7(a) Find the inverse Z - Transform, x(n) for given function –

$$X(z) = \frac{z}{(z-1)(z-2)}$$

(b) What is multirate DSP system? Also write various applications of DSP.

8 Derive and explain N- point Radix -2 DIT FFT algorithm for N = 8. Also Draw the signal flow graph.

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B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-5311 (EL-I) CMOS VLSI DESIGN

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) What is CMOS technology? Draw and explain 2-input CMOS NOR gate. ***07***

(b) Draw and explain the transfer characteristics of a Tri-state inverter. ***07***

2(a) Draw and discuss the output characteristics of an n-channel MOSFET. ***07***

(b) With regard to a MOS transistor, explain sub-threshold current and its impact on the VLSI circuits. ***07***

3(a) Discuss in detail the power dissipation in CMOS circuits. ***07***

(b) Explain "noise margin" and its importance in VLSI design. ***07***

4(a) Define Propagation delay, Rise time and Fall time. ***07***

(b) Draw and explain RC delay model of MOS transistor. ***07***

5(a) Explain wafer preparation in IC fabrication. ***07***

(b) With diagram, explain photolithography process in IC fabrication. ***07***

6(a) Define logical effort. Find logical effort of a two-input NAND gate. ***07***

(b) Draw and discuss physical layout of a CMOS inverter. ***07***

7(a) What do you mean by process variation? Discuss the effect of process variation in VLSI circuits. ***07***

(b) What is a Pass transistor? Show that a PMOS transistor passes a strong logic "1" while a weak logic "0". ***07***

8(a) Write a short note on VLSI interconnects. ***07***

(b) Write short note on scaling of MOS devices. ***07***

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

CS-5351 (OEL-I) SOFTWARE ENGINEERING & PROJECT MANAGEMENT

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Explain the scope of software engineering and its significance in modern software development. ***07***

(b) Compare and contrast various software process models like the Waterfall model, Prototyping model, Incremental model, and Spiral model. ***07***

2(a) Compare the Capability Maturity Model (CMM) and ISO 9000 in terms of their objectives and implementation in the software industry. ***07***

(b) Discuss the role of software prototyping in requirement gathering and system design. ***07***

3(a) Discuss various software testing strategies including unit testing, integration testing, validation testing, and system testing. ***07***

(b) Compare top-down and bottom-up design strategies with examples. ***07***

4(a) Differentiate between white box and black box testing with examples. ***07***

(b) Describe programming practices and coding standards that help improve software quality. ***07***

5(a) Discuss the various types of software maintenance and their role in the software lifecycle. ***07***

(b) Explain how project scheduling and tracking are performed in software engineering. ***07***

6(a) Describe the principles and concepts of effective modular design. ***07***

(b) Discuss the COCOMO model for software cost estimation and Estimate the effort and development time for a software project of size 50 KLOC using the Basic COCOMO Model in Organic mode. (Values are : a = 2.4, b = 1.05, c = 2.5, d = 0.38) ***07***

7(a) Discuss the economic, maintenance, specification, design, and team programming aspects of software engineering. ***07***

(b) Explain the objectives of project planning and define software scope with relevant examples. ***07***

8(a) Explain the risk management process in software projects, including identification, monitoring, and management of risks. ***07***

(b) Write short notes on **any two** : ***07***

(i) Aspects of Software Engineering
(ii) Fundamentals of software testing
(iii) Requirement analysis phase

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