

# CBCS SCHEME

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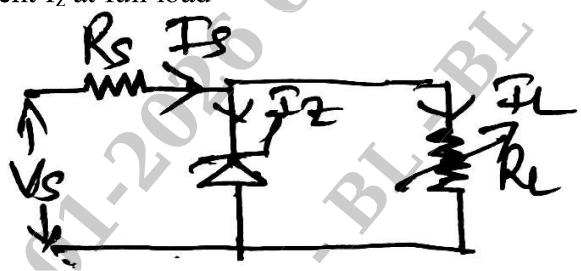
BESCK104C

## First Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Introduction to Electronics and Communication

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Draw the block diagram of Regulated power supply and mention the function of each block.	8	L2	CO1
	b.	An amplifier produces an output voltage of 4V from an input of 100mV. If the i/p and output current in this condition are 2mA and 100mA respectively. Find : i) Voltage gain ii) Current gain iii) Power gain.	6	L3	CO1
	c.	What is a Rectifier? With neat circuit diagram and output waveforms, explain half wave rectifier with capacitor filter.	6	L2	CO1
OR					
Q.2	a.	Explain the concept of Negative feedback amplifier with neat diagram and relevant equation.	5	L2	CO1
	b.	5 V stabilized power supply is required to be produced from a 12 V DC power supply input source. The maximum power rating of the zener diode is 2W. Using zener regulator circuit shown in Fig Q2(b). Calculate : i) Maximum current flowing through zener diode ii) Minimum value of series resistor iii) Load current if a load resistor of 1kΩ connected across zener diode iv) Zener current $I_z$ at full load	8	L3	CO1
 <p style="text-align: center;">Fig Q2(b)</p>					
	c.	List and explain various types of amplifiers.	7	L2	CO1
Module – 2					
Q.3	a.	With circuit diagram, explain the operation of an Wien bridge oscillator.	8	L2	CO2
	b.	Explain the following with respect to operational amplifier. i) Non inverting amplifier ii) Differentiator	8	L2	CO2
	c.	List out the Ideal characteristics of op amp?	4	L1	CO2

<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	With a neat circuit diagram, explain the operation of RC phase shift oscillator.	<b>8</b>	<b>L2</b>	<b>CO2</b>
	<b>b.</b>	Explain the operation of single stage Astable multi-vibrator with its circuit diagram.	<b>8</b>	<b>L2</b>	<b>CO2</b>
	<b>c.</b>	Define the following parameter of op amp i) CMRR ii) Slew Rate.	<b>4</b>	<b>L1</b>	<b>CO2</b>
<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	Convert the following : i) $5369_{(10)} = (?)_2 = (?)_8$ ii) $10110001101011.11110010_{(2)} = (?)_{16}$ iii) $1010.011_{(2)} = (?)_{10}$ iv) $5678_{(10)} = (?)_{16}$ v) $3FCD_{(16)} = (?)_2 = (?)_{16}$	<b>10</b>	<b>L3</b>	<b>CO3</b>
	<b>b.</b>	Simplify the following Boolean functions : i) $Y = A\bar{B} + AB$ ii) $Y = (A + B)(A + C)$ iii) $F = Y[(X + \bar{Y})(Y + Z)]$ iv) $Z = B(A + C) + C$ v) $F = A + \bar{A}B$	<b>10</b>	<b>L3</b>	<b>CO3</b>
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	Define Full Adder. Explain full adder using two half adders and one OR gate. Write the equation for sum and $C_{out}$ .	<b>8</b>	<b>L2</b>	<b>CO3</b>
	<b>b.</b>	Write the step by step procedure to design a combinational circuit.	<b>4</b>	<b>L2</b>	<b>CO3</b>
	<b>c.</b>	Subtract the following using 1's and 2's complement method : i) $(110010 - 11001)_2$ ii) $(1001 - 10000)_2$	<b>8</b>	<b>L3</b>	<b>CO3</b>
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	What is an embedded system? Compare embedded system with general purpose computer systems.	<b>8</b>	<b>L1</b>	<b>CO4</b>
	<b>b.</b>	Explain 7 segment LED display.	<b>6</b>	<b>L2</b>	<b>CO4</b>
	<b>c.</b>	Write a short notes on : i) Transducers ii) Sensors.	<b>6</b>	<b>L2</b>	<b>CO4</b>
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	Write the difference between RISC and CISC processors.	<b>6</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	List out the major applications areas of embedded systems.	<b>6</b>	<b>L1</b>	<b>CO4</b>
	<b>c.</b>	Discuss the elements of typical embedded systems.	<b>8</b>	<b>L2</b>	<b>CO4</b>
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	What are the advantages of Digital communication over Analog communication?	<b>5</b>	<b>L1</b>	<b>CO5</b>
	<b>b.</b>	With neat block diagram of basic communication system, explain the individual blocks.	<b>8</b>	<b>L2</b>	<b>CO5</b>
	<b>c.</b>	Define Noise and explain the various kinds of noise.	<b>7</b>	<b>L2</b>	<b>CO5</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Mention the need for modulation.	<b>4</b>	<b>L1</b>	<b>CO5</b>
	<b>b.</b>	Write a short notes on : i) ASK ii) FSK.	<b>6</b>	<b>L2</b>	<b>CO5</b>
	<b>c.</b>	Explain Amplitude and frequency modulation. Sketch AM and FM waveforms.	<b>10</b>	<b>L2</b>	<b>CO5</b>

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BESCK204C

## Second Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Introduction to Electronics and Communication

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	<b>a.</b>	What is rectifier? Explain full wave bridge rectifier with capacitor filter.	8	L2	CO1
	<b>b.</b>	Explain the block diagram of dc power supply and mention the functions of each block.	8	L2	CO1
	<b>c.</b>	Classify the different types of amplifiers.	4	L2	CO1
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	Explain the operation of voltage regulator with neat circuit diagram.	8	L2	CO1
	<b>b.</b>	Illustrate the overall gain of negative feedback amplifier with a suitable block diagram.	8	L2	CO1
	<b>c.</b>	Outline the operation of voltage doubler with neat circuit diagram.	4	L2	CO1
<b>Module – 2</b>					
<b>Q.3</b>	<b>a.</b>	Explain the operation of ladder network oscillator with neat circuit diagram.	8	L2	CO2
	<b>b.</b>	Infer astable multivibrator circuit with necessary equations.	8	L2	CO2
	<b>c.</b>	In weigh bridge oscillator if $C_1 = C_2 = 200 \text{ nF}$ . Solve the frequency of oscillation, when $R_1 = R_2 = 4 \text{ K}\Omega$	4	L3	CO2
<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	Explain the following with respect to operational amplifiers: i) Differentiator      ii) Integrator.	8	L2	CO2
	<b>b.</b>	Outline the ideal characteristics of an operational amplifiers.	8	L2	CO2
	<b>c.</b>	For the following given data. Solve the summing amplifier where $R_f = 10 \text{ K}\Omega$ , $R_1 = 1 \text{ K}\Omega$ , $R_2 = 2 \text{ K}\Omega$ , $R_3 = 3 \text{ K}\Omega$ with $V_1 = 2 \text{ V}$ , $V_2 = 4 \text{ V}$ , $V_3 = 6 \text{ V}$ .	4	L3	CO2
<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	Solve the following: i) $(B65F)_{16} = (?)_{10}$ ii) $(10110001101011.111100000110)_2 = (?)_8$ iii) $(630.4)_8 = (?)_{10}$ iv) $(673.124)_8 = (?)_2$	8	L3	CO3

	<b>b.</b>	Make use of Boolean algebra, simplify the following and draw the logic circuit diagram: i) $(X + Y)(X + Z) = X + YZ$ ii) $XY + XZ + YZ' = XZ + YZ'$	6	L3	CO3
	<b>c.</b>	Solve Demorgan's theorem for two variables.	6	L3	CO3
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	Develop full adder circuit with its truth table and write the expression for sum and carry.	8	L3	CO3
	<b>b.</b>	Solve the following: i) $(1010100)_2 - (1000100)_2$ using 2's compliment ii) $(4456)_{10} - (34324)_{10}$ using 10's compliment method	6	L3	CO3
	<b>c.</b>	Develop combinational logic circuit with an example.	6	L3	CO3
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	Compare RISC and CISC processors.	8	L2	CO4
	<b>b.</b>	Summarize microprocessor and microcontroller.	6	L2	CO4
	<b>c.</b>	List out the major application areas of embedded systems.	6	L1	CO4
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	Compare Transducer, Sensor and Actuators.	8	L2	CO4
	<b>b.</b>	Explain the classification of embedded systems.	6	L2	CO4
	<b>c.</b>	What is 7-segment LED display?	6	L1	CO4
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	Analyze the different multiple access technique in the digital communication in detail.	8	L4	CO5
	<b>b.</b>	Explain the modern communication systems with a neat block diagram.	6	L2	CO5
	<b>c.</b>	Define Modulation. What is the need of modulation?	6	L1	CO5
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Analyze the benefits of digital communication systems over analog communication systems.	8	L4	CO5
	<b>b.</b>	Explain the following with the help of neat waveforms: i) ASK ii) FSK.	6	L2	CO5
	<b>c.</b>	List the functions of hard wired channel and soft wired channel.	6	L1	CO5

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BEC302

## Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Digital System Design Using Verilog

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	<b>a.</b>	Define the following : i) Canonical SOP ii) Canonical POS iii) Essential Prime Implicant (EPI) iv) Prime Implicant (PI) v) Min term and Max term with a table of two input variable representation	10	L1	CO1
	<b>b.</b>	Using Quine Mccluskey method and PI reduction table, determine the minimal SOP expression for the following function. $Y = f(a, b, c, d) = \Sigma(1, 2, 3, 5, 9, 12, 14, 15) + \Sigma d(4, 8, 11)$	10	L3	CO1
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	Explain the procedure to place SOP and POS equations into canonical form convert the following equations into canonical forms i) $T = f(a, b, c) = (a + b')(b' + c)$ ii) $G = f(w, x, y, z) = w'x + yz'$	10	L3	CO1
	<b>b.</b>	Solve the given functions using Kamangh Map i) $F = f(w, x, y, z) = \Sigma(0, 7, 8, 9, 10, 12) + \Sigma d(2, 5, 13)$ ii) $G = f(a, b, c, d) = \pi(0, 4, 5, 7, 8, 9, 11, 12, 13, 15)$ Also identify the prime implicants.	10	L3	CO1
<b>Module – 2</b>					
<b>Q.3</b>	<b>a.</b>	Implement the function using multiplexers i) $f(x, y, z) = \Sigma m(0, 2, 3, 5)$ using $4 \times 1$ multiplexer ii) $f(w, x, y, z) = \Sigma m(0, 1, 5, 6, 7, 9, 12, 15)$ using $8 \times 1$ multiplexer.	10	L2	CO2
	<b>b.</b>	Explain the concept of carry look ahead adder with related equation and block diagram.	10	L2	CO2
<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	Using a 4-bit binary adder, design a logic to convert a decimal digit in 8421 code into a decimal adder.	10	L3	CO2
	<b>b.</b>	Implement the following functions using 3 : 8 decoder. i) $P = f(w, x, y, z) = \Sigma(1, 4, 8, 13)$ $Q = g(w, x, y, z) = \Sigma(2, 7, 13, 14)$ ii) $A = f(x, y, z) = \pi(0, 1, 3, 5)$ $B = f(x, y, z) = \Sigma(1, 4, 5, 7)$	10	L3	CO2

<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	Explain master slave JK flip-flop with the help of circuit diagram and timing diagrams.	<b>10</b>	<b>L2</b>	<b>CO3</b>
	<b>b.</b>	Design a synchronous Mod -6 counter with sequence 0-2-3-6-5-1 using JK flip-flop.	<b>10</b>	<b>L3</b>	<b>CO3</b>
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	Design a 4-bit binary ripple up counter with logic diagram and counting sequence and explain its operation.	<b>10</b>	<b>L3</b>	<b>CO3</b>
	<b>b.</b>	With the help of logic diagram and counting sequence, explain. i) Ring counter ii) Mod – 8 twisted ring counter.	<b>10</b>	<b>L2</b>	<b>CO3</b>
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	What are the different data types in verilog. Explain with examples.	<b>10</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	i) Develop a verilog program to implement 2×1 multiplexer using conditional operator. Also write the truth table of 2×1 mux ii) Design a 2×1 multiplexer using dataflow verilog description draw a logic diagram and logic gate level circuit for it.	<b>4</b> <b>6</b>	<b>L3</b> <b>L3</b>	<b>CO4</b> <b>CO4</b>
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	Discuss in detail different description styles in verilog.	<b>8</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	Let A = 5' b11011, B = 5' b 10101 C = 4' d3 Determine the output the following verilog statements. i) d = & A    ii) e = ~^4' b1011    iii) f = ~ (A & (~B)) iv) g = A   B    v) b = 3** 2    vi) i = {2{A}}	<b>12</b>	<b>L3</b>	<b>CO4</b>
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	Design a 4-bit counter with synchronous hold using verilog. Also draw the simulation waveform.	<b>10</b>	<b>L3</b>	<b>CO5</b>
	<b>b.</b>	Explain the operation of positive edge triggered JK flip-flop by using a verilog code using case statement. Write truth table and timing diagram.	<b>10</b>	<b>L2</b>	<b>CO5</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Explain the operation of half adder and implement using structural description in verilog.	<b>6</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	Write the verilog format of case statement and explain.	<b>4</b>	<b>L2</b>	<b>CO5</b>
	<b>c.</b>	Develop a verilog behavioral description for 3 bit binary up counter.	<b>6</b>	<b>L3</b>	<b>CO5</b>
	<b>d.</b>	Develop a verilog program for D latch using behavioral description style.	<b>4</b>	<b>L3</b>	<b>CO5</b>

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BEC401

## Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Electromagnetic Theory

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	a.	Point charges of 50 nC each are located at A ( 1 , 0 , 0 ), B (-1,0,0) , C (0,1,0) and D ( 0 , -1 , 0 ) in free space. Find the total force on the charge located at A .	08	L3	CO1
	b.	Obtain an expression for electric field intensity at a distant point due to infinite long line charge.	08	L2	CO1
	c.	Define Electric flux density.	04	L2	CO1
<b>OR</b>					
<b>Q.2</b>	a.	Find the total charge within the volume $0 \leq \rho \leq 0.1$ , $0 \leq \phi \leq \pi$ , $0 \leq z \leq 4$ If $\rho_v = \rho^2 z^2 \sin ( 0.6 \phi )$	08	L3	CO1
	b.	Given a 60 $\mu$ C point charge located at the origin, find the total electric flux passing through i) that portion of the sphere $r = 26$ cm bounded by $0 \leq \theta \leq \pi/2$ and $0 \leq \phi \leq \pi/2$ ii) The closed surface defined by $\rho = 26$ cm and $z = \pm 26$ cm.	08	L3	CO1
	c.	Define surface charge and volume charge density.	04	L1	CO1
<b>Module – 2</b>					
<b>Q.3</b>	a.	State and prove Divergence theorem.	06	L2	CO2
	b.	Calculate volume charge density $\rho_v$ if $\vec{D} = \frac{10 \cos \theta \sin \phi}{r} \vec{a}_r$ c / m <sup>2</sup>	08	L3	CO2
	c.	Derive point form of continuity equation.	06	L2	CO2
<b>OR</b>					
<b>Q.4</b>	a.	State and prove Gauss Law.	05	L2	CO2
	b.	Given the electric field $\vec{E} = 2x\vec{a}_x - 4y\vec{a}_y$ v/m Find the work done in moving a point charge 2c from ( 2 , 0,0) to ( 0 , 0 , 0) and then from ( 0 , 0,0 ) to ( 0 , 2 , 0).	07	L3	CO3
	c.	If $\vec{D} = \frac{5r^2}{4} \vec{a}_r$ c / m <sup>2</sup> , then evaluate both sides of the divergence theorem for the volume enclosed by $r = 4$ m, $\theta = \pi/4$ radians	08	L3	CO3
<b>Module – 3</b>					
<b>Q.5</b>	a.	Starting from point form of Gauss law deduce Poisson's and Laplace's equation.	06	L2	CO3
	b.	Using Laplace's equation obtain an expression for capacitance of parallel plate capacitor.	08	L3	CO3
	c.	State and explain Ampere's Law.	06	L1	CO3

OR

Q.6	a.	Derive an expression for magnetic field intensity at a distant point due to infinite long straight conductor using Biot – Savart’s law.	08	L2	CO3
	b.	State and explain Stoke’s theorem.	06	L1	CO3
	c.	Given $\vec{H} = [y \cos(\alpha x)]\vec{a}_x + (y + e^x)\vec{a}_z$ A/M. Find current density vector over yz plane.	06	L3	CO3

Module – 4

Q.7	a.	Derive the expression for force between the differential current elements.	08	L2	CO4
	b.	Obtain Lorentz force equation.	06	L2	CO4
	c.	A conductor 4 m long lies along the y – axis with a current of 10 A in the $\vec{a}_y$ direction. Find the force on the conductor if the field is $\vec{B} = 0.005 \vec{a}_x$ Tesla.	06	L3	CO4

OR

Q.8	a.	Define Magnetization and Permeability.	04	L1	CO4
	b.	If $\vec{B} = 0.05 \times \vec{a}_y$ T in a material for which magnetic susceptibility $X_m = 2.5$ . Find: i) $\mu_r$ ii) $\mu$ iii) $\vec{H}$ iv) $\vec{M}$ v) $\vec{J}$	08	L3	CO4
	c.	Discuss the boundary conditions at the interface between two media of different permeabilities.	08	L4	CO4

Module – 5

Q.9	a.	Write Maxwell’s equations in point form and integral form for time varying fields.	08	L2	CO5
	b.	Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^4$ $\text{S/m}$ and $\epsilon_r = 81$	06	L3	CO5
	c.	Do the fields $\vec{E} = E_m \sin x \sin t \vec{a}_y$ and $\vec{H} = \frac{E_m}{\mu_0} \cos x \cos t \vec{a}_z$ satisfy Maxwell’s equation?	06	L3	CO5

OR

Q.10	a.	Derive a wave equation for a uniform plane wave in free space.	08	L2	CO5
	b.	State and prove Poynting theorem.	08	L2	CO5
	c.	The depth of penetration in a certain conducting medium is 0.1 m and frequency of the electromagnetic wave is 1.0 MHz. Find the conductivity of the medium.	04	L3	CO5

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21EC51

## Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Digital Communication

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define M – ary QAM. Obtain the constellation of QAM for M = 4 and draw the signal space diagram. (06 Marks)
- b. An FSK system transmits binary data at the rate of  $2.5 \times 10^6$  bits/s. During the course of transmission, white Gaussian noise of zero mean and power spectral density  $10^{-20}$  W/Hz is added to the signal. In the absence of noise, the amplitude of the received sinusoidal wave for digit 1 or 0 is  $1 \mu\text{v}$ . Determine the average probability of symbol error for binary FSK using coherent detection. (04 Marks)
- c. Derive the expression for error probability of BPSK using coherent detection. (10 Marks)

OR

- 2 a. Describe the QPSK signal with its signal space diagram. With a neat block diagram, explain the generation and detection of QPSK signals. (10 Marks)
- b. Derive the expression for probability of symbol error of coherent binary FSK. (10 Marks)

### Module-2

- 3 a. Explain the geometric representation of signals and express the energy of the signal in terms of the signal vector. (10 Marks)
- b. With a neat block diagram, explain the digital PAM transmission through band limited baseband channels and obtain the expression for ISI. (10 Marks)

OR

- 4 a. Explain the correlation receiver using product integrator and matched filter. (10 Marks)
- b. The waveforms of three signals are as shown :

$$S_1(t) = 1, 0 < t < \frac{T}{3}$$

$$S_2(t) = 1, 0 < t < \frac{2T}{3}$$

$$S_3(t) = 1, \frac{T}{3} < t < T$$

And zero otherwise. Using the Gram – Schmidt orthogonalization procedure, find an orthonormal basis for this set of signals. (10 Marks)

### Module-3

- 5 a. Explain the generation of direct sequence spread spectrum signal, with relevant waveforms and spectrums. Also, explain the effect of spreading on Narrowband interference. (10 Marks)
- b. With a neat block diagram, explain the CDMA system based on IS-95. (10 Marks)

OR

- 6 a. With a neat block diagram, explain the frequency hopped spread spectrum techniques. (10 Marks)
- b. Explain the model of spread spectrum digital communication system. Also, write a note on applications of DS spread – spectrum signals. (10 Marks)

**Module-4**

- 7 a. Define :  
i) Self Information  
ii) Entropy  
iii) Rate of Information (03 Marks)
- b. A black and white TV picture consists of 525 lines of picture information. Assume that each line consists of 525 picture elements and that each element can have 256 brightness levels. Pictures are repeated at the rate of 30 frames/ second. Calculate the average rate of information conveyed by a TV set to a viewer. (05 Marks)
- c. An information source produces a sequence of independent symbols having the following symbol probabilities :

Symbols	A	B	C	D	E	F	G
Probability	1/3	1/27	1/3	1/9	1/9	1/27	1/27

Construct binary Huffman codes. Obtain code efficiency and redundancy. Draw tree diagram for the codes. (12 Marks)

OR

- 8 a. Explain different properties of code. Mention Kraft's inequality condition. (10 Marks)
- b. Apply Shannon's binary encoding algorithm for the source emitting independent symbols having the following symbol probabilities:

Symbols	A	B	C	D	E	F	G
Probability	9/32	3/32	1/16	3/32	3/32	3/32	9/32

Obtain code efficiency and redundancy. Draw tree diagram for the codes. (10 Marks)

**Module-5**

- 9 a. The parity check bits of (6, 3) linear block code is given by :  
 $C_4 = d_1 + d_2$  ;  $C_5 = d_1 + d_2 + d_3$  ;  $C_6 = d_2 + d_3$  where  $d_1, d_2, d_3$  are message bits.  
 i) Find the generator matrix and parity check matrix for this code.  
 ii) Find all possible code vectors  
 iii) Draw encoder circuit  
 iv) How many errors can be detected and corrected.  
 v) If single error has occurred in the received vector [ 101110] detect and correct the error. (10 Marks)

- b. For the convolution encoder shown in fig. 9(b). Find the encoder output produced for the message sequence [10011] using  
 i) Time domain approach  
 ii) Transform domain approach

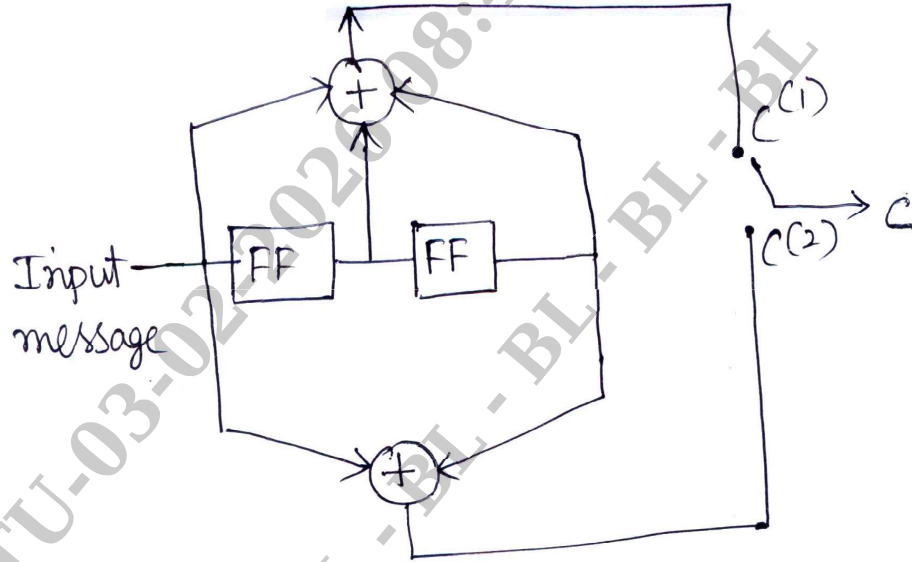


Fig. Q.9(b)

(10 Marks)

OR

- 10 a. For the convolutional encoder shown in fig. 10(a)

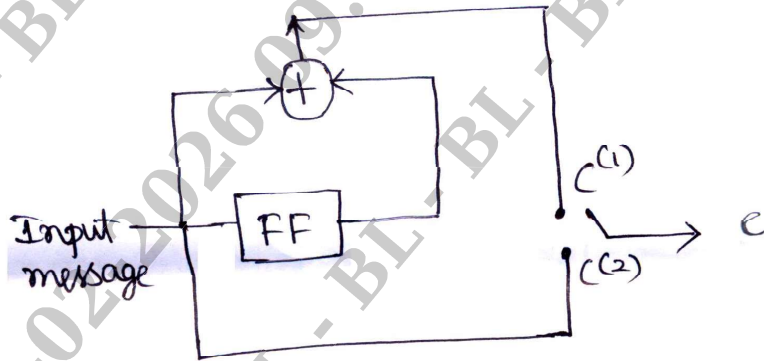


Fig. Q. 10 (a)

Draw state diagram, code tree and Trellis diagram. Find the code vector for the message sequence [1 0 1]

(12 Marks)

- b. Construct the standard array for (4,2) code. If  $G = \begin{bmatrix} 1 & 0 & | & 1 & 1 \\ 0 & 1 & | & 0 & 1 \\ & & & & \end{bmatrix}$

If  $R = [1 1 1 1]$  find the correct code vector.

(08 Marks)

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21EC52

## Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Computer Organization and ARM Microcontroller

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. With neat diagram explain the basic connection between Processor and Memory. (06 Marks)
- b. Explain the computer basic performance equation by mentioning each parameter into equation. (06 Marks)
- c. Explain : (i) Nested Interrupt (ii) Daisy – Chain Method. (08 Marks)

### OR

- 2 a. With neat diagram explain the operation of DMA controller. (06 Marks)
- b. What is Bus Arbitration? Explain centralized and distributed arbitration scheme with diagram. (09 Marks)
- c. Explain PCI bus along with data transfer signals. (05 Marks)

### Module-2

- 3 a. Explain internal organization of memory chip with an example. (06 Marks)
- b. Illustrate SRAM Cell Structure. (06 Marks)
- c. Define Cache Memory. Explain Direct-mapped cache technique with diagram. (08 Marks)

### OR

- 4 a. Illustrate the control sequence for execution of the instruction Add (R<sub>3</sub>), R<sub>1</sub> in the processor. (06 Marks)
- b. Explain microprogrammed control unit with suitable diagram. (08 Marks)
- c. Describe basic concepts of pipelining. (06 Marks)

### Module-3

- 5 a. Discuss implementation philosophy of RISC with four major design rules. (06 Marks)
- b. Categorize various AMBA bus protocol used in ARM processor with their performance characteristics. (06 Marks)
- c. With neat diagram explain ARM based embedded device (Microcontroller) with four main hardware components. (08 Marks)

**OR**

- 6 a. Explain ARM core data flow model with neat diagram. (08 Marks)
- b. Give the schematic of current program status register of ARM processors with bit field configuration. (06 Marks)
- c. Explain in brief Exceptions, Interrupts and the Vector Table. (06 Marks)

**Module-4**

- 7 a. What is the need of barrel shifter in ARM processor? List and explain various barrel shifter operations. (06 Marks)
- b. Brief about the categories of Load-Store instructions used with ARM. (06 Marks)
- c. Explain with example the following 32-bit instruction of ARM processor:  
(i) CMN      (ii) MLA      (iii) CLZ      (iv) BIC (08 Marks)

**OR**

- 8 a. Explain the ARM swap instruction with an example code. (06 Marks)
- b. Write an ALP to multiply two 16-bit binary numbers. (06 Marks)
- c. Explain about Loading Constants and Conditional Execution with example. (08 Marks)

**Module-5**

- 9 a. Discuss about thumb register usage in ARM processor. (06 Marks)
- b. Explain ARM-Thumb interworking with an example. (06 Marks)
- c. Write a short notes on STACK instruction and SOFTWARE INTERRUPT instruction. (08 Marks)

**OR**

- 10 a. List out and explain the basic C data types. (06 Marks)
- b. Discuss using C and assembly program, how descending loop improve the performance compared with the incrementing loop. (08 Marks)
- c. Explain Loop unrolling with an example. (06 Marks)

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# CBCS SCHEME

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BEC515D

## Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Satellite and Optical Communication

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	<b>a.</b>	Write short note on : 1. Apogee and Perigee distance 2. Umbra and Penumbra region of an eclipse	4	L1	CO1
	<b>b.</b>	Explain three Keplers law of planetary motion.	8	L2	CO1
	<b>c.</b>	Illustrate the concept of Injection velocity and resulting satellite trajectories with neat diagrams and expressions.	8	L2	CO1
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	A satellite is moving in an elliptical orbit with the major axis equal to 42000 km. If the perigee distance is 8000 km, find the apogee and the orbit eccentricity.	4	L1	CO1
	<b>b.</b>	Describe different types of satellite orbit with respect to orientation of orbital plane and distance from earth.	8	L2	CO1
	<b>c.</b>	A satellite launched with an injection velocity $V_1$ from a point above the surface of the earth at a distance P from center of earth attains an elliptical orbit with an apogee distance $A_1$ . The same satellite when launched with an injection velocity $V_2$ from the same perigee distance attains an elliptical orbit with an apogee distance $A_2$ . Derive the relationship between $V_1$ and $V_2$ in terms of P , $A_1$ and $A_2$ .	8	L2	CO1
<b>Module – 2</b>					
<b>Q.3</b>	<b>a.</b>	Write short note on satellite subsystem.	5	L1	CO2
	<b>b.</b>	Explain with neat diagrams solar energy driven power system.	7	L2	CO2
	<b>c.</b>	Explain with suitable diagram, monopulse tracking and lobe switching techniques.	8	L2	CO2
<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	Write short note on Altitude and Orbit control.	5	L1	CO2
	<b>b.</b>	Explain earth station architecture with generalized earth station block diagram.	7	L2	CO2
	<b>c.</b>	Illustrate with neat schematic diagram, Tracking , Telemetry and Command subsystem.	8	L2	CO2

<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	What are Communication related Application of satellites?	<b>4</b>	<b>L1</b>	<b>CO3</b>
	<b>b.</b>	Explain with neat block diagram transparent or bent pipe transponders.	<b>8</b>	<b>L2</b>	<b>CO3</b>
	<b>c.</b>	Describe with neat block diagram Satellite Cable Television.	<b>8</b>	<b>L2</b>	<b>CO3</b>
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	List out any 5 advantages of satellite over Terrestrial Networks.	<b>4</b>	<b>L1</b>	<b>CO3</b>
	<b>b.</b>	Explain with neat diagrams Direct To Home (DTH) Satellite Television.	<b>8</b>	<b>L2</b>	<b>CO3</b>
	<b>c.</b>	Describe with neat block diagram, basic elements of a Satellite Communication system.	<b>8</b>	<b>L2</b>	<b>CO3</b>
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	Consider a multimode step index optical fiber that has a core radius of $25 \mu\text{m}$ , a core index of 1.48 and an index difference $\Delta = 0.01$ . Find the percentage of optical power that propagates in the cladding at 840 nm.	<b>5</b>	<b>L1</b>	<b>CO4</b>
	<b>b.</b>	Describe in detail about different fiber materials.	<b>7</b>	<b>L2</b>	<b>CO4</b>
	<b>c.</b>	Derive the expression for numerical aperture from Ray Theory.	<b>8</b>	<b>L2</b>	<b>CO4</b>
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	Consider a multimode silica fiber that has a core refractive index $n_1 = 1.480$ and a cladding index $n_2 = 1.460$ . Find i) Critical angle ii) the numerical aperture iii) the acceptance angle.	<b>5</b>	<b>L1</b>	<b>CO4</b>
	<b>b.</b>	Explain different types of bending losses.	<b>7</b>	<b>L2</b>	<b>CO4</b>
	<b>c.</b>	Illustrate with necessary diagram Mode theory for circular waveguide.	<b>8</b>	<b>L2</b>	<b>CO4</b>
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	Explain the principle of Operation of PIN photodiode.	<b>10</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	Illustrate the concept of diffraction grating with necessary diagram.	<b>10</b>	<b>L2</b>	<b>CO5</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Explain with necessary diagram, the working principle of LASER diodes.	<b>10</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	Discuss about the Operational principles of WDM.	<b>10</b>	<b>L2</b>	<b>CO5</b>

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BEC654C/BTE654C

## Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Electronic Communication System

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M: Marks, L: Bloom's level, C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	Briefly, explain what are the different modes of communications.	6	L2	CO1
	b.	Explain with a neat block diagram the element of electronic and communication system.	10	L2	CO1
	c.	An RF amplifier has an input signal power of 1W and delivers the output signal with 10W power. Determine its power gain in decibels (dB).	4	L3	CO1
OR					
Q.2	a.	With a neat block diagram, explain the element of digital communication system.	8	L2	CO1
	b.	Define and explain frequency division multiplexing.	8	L2	CO1
	c.	Determine the antenna gain of a reflector dish antenna having an effective area of $0.56\pi$ , operating at 12 GHz.	4	L3	CO1
Module – 2					
Q.3	a.	Define and explain amplitude modulation with necessary expression and waveforms.	10	L2	CO2
	b.	Derive the expression for the total power in a single tone AM signal.	10	L3	CO2
OR					
Q.4	a.	Show how the modulation index can be computed by displaying the AM envelope on an oscilloscope.	10	L3	CO2
	b.	Define transmission efficiency of AM signal and derive its expression.	6	L3	CO2
	c.	Describe the limitations of amplitude modulation.	4	L2	CO2
Module – 3					
Q.5	a.	Define Pulse Amplitude Modulation (PAM) with necessary diagrams. Explain the different types of sampling in PAM.	10	L2	CO3
	b.	Explain the generation and demodulation of Pulse Position Modulation (PPM)	10	L2	CO3
OR					
Q.6	a.	State and prove sampling theorem.	10	L3	CO3
	b.	Explain the generation and detection of Pulse Width Modulation (PWM)	10	L2	CO3

<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	Define and state and properties of entropy.	<b>5</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	Describe the four basic types of redundancy checks.	<b>12</b>	<b>L2</b>	<b>CO4</b>
	<b>c.</b>	A communication system consists of 6 messages with probabilities $1/8, 1/8, 1/8, 1/8, 1/4$ and $1/4$ respectively. Determine the entropy of the system.	<b>3</b>	<b>L3</b>	<b>CO4</b>
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	With a neat block diagram, explain BPSK modulator and demodulator.	<b>8</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	With necessary expressions and waveforms, explain Amplitude Shift Keying (ASK).	<b>6</b>	<b>L2</b>	<b>CO4</b>
	<b>c.</b>	Explain QPSK with necessary expression and the constellation diagram.	<b>6</b>	<b>L2</b>	<b>CO4</b>
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	Describe the frequency reuse concept in cellular communications.	<b>8</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	Draw the cell structure in cellular communication and explain.	<b>8</b>	<b>L2</b>	<b>CO5</b>
	<b>c.</b>	A cellular communication service area is covered with 12 clusters having 7 cells in each cluster and 16 channels assigned in each cell. Determine : i) Number of channels cluster ii) System capacity.	<b>4</b>	<b>L2</b>	<b>CO5</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Discuss the advantages and disadvantages of wireless communications.	<b>10</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	List and briefly explain the main areas of wireless applications.	<b>10</b>	<b>L2</b>	<b>CO5</b>

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21EC741

## Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 IoT and Wireless Sensor Networks

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Explain the IoT protocols applicable to the Link Layer. (08 Marks)
- b. Explain the following IoT communication models:  
i) Request – Response Communication Model  
ii) Publish – Subscribe Communication Model  
iii) Push – Pull Communication Model  
iv) Exclusive – Pair Communication Model (12 Marks)

**OR**

- 2 a. List the different technologies which have enabled IoT. Explain any two of them. (10 Marks)
- b. Explain the basic components of an IoT system. (05 Marks)
- c. With the help of a neat figure, explain the IoT Level 3. (05 Marks)

### Module-2

- 3 a. Explain the Home automation application of IoT by referring to its key features. (10 Marks)
- b. Explain the Logistics application of IoT by mentioning its key features. (10 Marks)

**OR**

- 4 a. Explain the environment application of IoT by mentioning its key features. (10 Marks)
- b. Explain the cities application of IoT by mentioning its key features. (10 Marks)

### Module-3

- 5 a. With the help of a neat figure, explain the generic protocol stack for sensor networks. (07 Marks)
- b. Explain the Data-centric Routing Protocol and Hierarchical routing protocols. Give one example for each. (08 Marks)
- c. With the help of a neat figure, explain the components of a sensing node. (05 Marks)

**OR**

- 6 a. Compare the first generation, second generation and third generation sensor networks based on their size, weight, deployment mode, node architecture protocols, power supply and lifespan. (10 Marks)
- b. List and explain the challenges and hurdles of wireless sensor networks. (10 Marks)

**Module-4**

- 7 a. Explain the five basic software subsystems of sensors. (10 Marks)
- b. Explain the design constraints or requirements for wireless sensor networks and wireless nodes. (10 Marks)

**OR**

- 8 a. Explain the Bluetooth and wireless LAN technology by mentioning the data rates, range of coverage and operating frequency band. (10 Marks)
- b. Explain the cognitive radio and 3G cellular networks. (10 Marks)

**Module-5**

- 9 a. Explain the basic middleware functions of WSN. (10 Marks)
- b. Explain the three data related functions of middleware for WSN. (10 Marks)

**OR**

- 10 a. List and explain the performance metrics of WSN. (10 Marks)
- b. Explain the following with respect to the traffic model:  
i) Event based delivery  
ii) Continuous delivery  
iii) Query-based delivery  
iv) Hybrid delivery (10 Marks)

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21EC752

Seventh Semester B.E. Degree Examination, Dec.2025/Jan.2026

## ARM Embedded Systems

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. Explain embedded system hardware with a diagram. (12 Marks)  
b. Explain various stages of pipeline operation with an example. (08 Marks)

OR

- 2 a. Explain a basic layout of generic program status registrar. (12 Marks)  
b. Explain three hardware extensions of ARM with relevant diagrams. (08 Marks)

### Module-2

- 3 a. With an example, explain various Load – store instructions. (13 Marks)  
b. Explain Software interrupt instruction, with an example. (04 Marks)  
c. Explain Conditional execution. (03 Marks)

OR

- 4 a. Explain the following for data processing instruction with an example :  
i) Move instructions                      ii) Barrel shifter  
iii) Arithmetic instructions              iv) Logical instructions (12 Marks)  
b. Explain ARM – Thumb interworking with an example. (05 Marks)  
c. Explain other branch instruction for Thumb. (03 Marks)

### Module-3

- 5 a. Explain different classification of embedded system with an example to each. (10 Marks)  
b. Explain the following on – board communication interfaces :  
i) I2C (Inter Integrated Circuit)  
ii) SPI (Serial Peripheral Interface) (10 Marks)

OR

- 6 a. Explain various purposes of embedded system with an example to each. (12 Marks)  
b. Explain three categories of RAM with relevant diagrams. (08 Marks)

### Module-4

- 7 a. Explain non – operational quality attributes to be considered in embedded system. (10 Marks)  
b. With a functional block diagram, explain the working of washing machine. (06 Marks)  
c. Explain FSM model for automatic seat belt warning system. (04 Marks)

OR

- 8 a. Explain fundamental issues in hardware and software co-design. (08 Marks)  
b. Explain different characteristics of embedded system. (08 Marks)  
c. Explain FSM model for timer. (04 Marks)

**Module-5**

- 9 a. Explain different services provided by real – time Kernel. (14 Marks)  
b. Explain elements of embedded system development environment. (06 Marks)

**OR**

- 10 a. Three processes P1, P2, P3 with estimated completion time 6 , 4, 2 milliseconds respectively, enters the ready queue together in the order P1, P2 , P3. Calculate the waiting time and turn around time (TAT) for each process and the average waiting time and turnaround time (assuming there is no I/O waiting for the processes) in RR algorithm with time and slice – 2 ms. (07 Marks)  
b. Explain process states and process transition. (05 Marks)  
c. Explain in circuit emulator based firmware debugging with a diagram. (08 Marks)

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BEC701

**Seventh Semester B.E/B.Tech. Degree Examination, Dec.2025/Jan.2026**

## Microwave Engineering and Antenna Theory

Time: 3 hrs.

Max. Marks:100

**Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Explain clearly how GUNN diode is being a negative resistance device.	6	L2	CO1
	b.	A certain transmission line has the characteristics impedance of $(75 + j0.01) \Omega$ and is terminated in load impedance of $(70 + j50)\Omega$ . Compute : i. The reflection coefficient ii. Transmission coefficient.	6	L3	CO1
	c.	Derive the equation of transmission line to find voltage and current on the line.	8	L3	CO1
<b>OR</b>					
2	a.	A transmission line is terminated in a resistive load of $1000 \Omega$ and has $L = 9\mu\text{H/m}$ and $C = 100 \text{ pF/m}$ . Calculate reflection co-efficient and standing wave ratio.	6	L3	CO1
	b.	Define reflection coefficient. Derive an expression for reflection co-efficient at load in terms of characteristic impedance and load impedance.	8	L3	CO1
	c.	Explain Microwave System with relevant diagram.	6	L2	CO1
<b>Module – 2</b>					
3	a.	Deduce the relation between incident and reflected waves in terms of S-parameters for a two port network.	6	L3	CO2
	b.	Derive an expression for input reflection co-efficient for two port network with mismatched load.	10	L3	CO2
	c.	Write a note on different losses in microwave network.	4	L4	CO2
<b>OR</b>					
4	a.	Explain the following with necessary sketches : i. Flexible co-axial cable ii. Movable vane attenuator.	10	L2	CO2
	b.	Explain magic tee and write its S-Matrix representation.	10	L2	CO2
<b>1 of 2</b>					

## Module – 3

5	a.	Explain parallel strip line with relevant diagram.	6	L2	CO3
	b.	A lossless parallel strip line has a conducting strip of width 'W'. The substrate dielectric separating the 2 conducting strips has a relative dielectric constant $\epsilon_{rd}$ of 6 and a thickness 'd' of 4mm. Calculate : i. Value of W so that $Z_0 = 50\Omega$ ii. Strip line capacitance iii. Strip line inductance iv. Phase velocity.	10	L3	CO3
	c.	Explain the following terms related to antenna systems : i. Directivity ii. Power Density.	4	L2	CO4

## OR

6	a.	Explain antenna radiation pattern. Prove that maximum effective aperture of short electric dipole is $0.119\lambda^2$ .	10	L3	CO4
	b.	State and prove Frii's Transmission formula.	6	L2	CO4
	c.	Explain the construction and field pattern of micro strip line.	4	L2	CO3

## Module – 4

7	a.	Derive the expression for radiation resistance of short electric dipole antenna.	10	L3	CO4
	b.	Obtain the expression for total electric field for array of n-point sources consider uniform linear array.	10	L2	CO4

## OR

8	a.	Explain principle of pattern multiplication.	6	L2	CO4
	b.	Write a note on Thin Linear Antenna.	8	L1	CO4
	c.	A thin dipole antenna is $\lambda/10$ long. If its loss resistance is $2.5\Omega$ . Find the radiation resistance and efficiency.	6	L3	CO4

## Module – 5

9	a.	Explain different types of horn antenna with relevant diagrams.	10	L2	CO5
	b.	The radius of a circular loop antenna is $0.02\lambda$ . How many turns of the antenna will give radiation resistance of $35\Omega$ ?	6	L3	CO5
	c.	Compare the far field components of small loop and short dipole antenna.	4	L1	CO5

## OR

10	a.	Explain Yagi-Uda antenna and list its applications.	10	L2	CO5
	b.	Explain Parabolic dish antenna or microwave dish antenna with relevant diagram.	10	L2	CO5

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BEC/BTE702

## Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Computer Networks and Protocols

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	<b>a.</b>	Explain the various types of physical topologies available in computer networks.	10	L2	CO1
	<b>b.</b>	With a neat diagram, explain the significance of layers in TCP/IP protocol suite.	10	L2	CO2
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	Explain LAN and WAN with the help of neat diagrams.	10	L2	CO1
	<b>b.</b>	What is an ARP? Explain the operation of ARP and its packet format with suitable diagrams.	10	L2	CO2
<b>Module – 2</b>					
<b>Q.3</b>	<b>a.</b>	Explain CSMA and show the behavior of the three persistence methods of CSMA.	10	L2	CO2
	<b>b.</b>	Describe flow control and error control in Data link layer.	5	L2	CO2
	<b>c.</b>	Write a 'C' program to perform Bit stuffing.	5	L2	CO3
<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	Explain CSMA/CA protocol with a flow diagram.	10	L2	CO2
	<b>b.</b>	Explain the Ethernet frame format of standard Ethernet.	5	L2	CO2
	<b>c.</b>	Write a 'C' program to perform Byte stuffing.	5	L2	CO3
<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	Explain the working of Dynamic Host Configuration Protocol [DHCP].	10	L2	CO3
	<b>b.</b>	With a neat diagram, explain the virtual circuit packet network and its various phases of operation.	10	L2	CO3
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	Explain IPv4 Datagram format, with a neat diagram.	10	L2	CO3
	<b>b.</b>	Explain distance vector routing and write a 'C' program to perform distance vector routing.	10	L2	CO3
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	Explain connectionless and connection oriented protocols in transport layer.	10	L2	CO2
	<b>b.</b>	Explain the working of Go-back-N protocol.	10	L2	CO2
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	With a neat diagram, explain state transition diagram of TCP.	10	L2	CO2
	<b>b.</b>	Explain UDP services along with neat diagram of Pseudo header for checksum.	10	L2	CO2
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	Explain the following with diagram : i) WWW    iii) HTTP    iii) FTP.	10	L2	CO4
	<b>b.</b>	Explain the architecture of electronic mail with a neat diagram.	10	L2	CO4
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Explain DNS Name space, DNS in the internet and resolution.	10	L2	CO4
	<b>b.</b>	Explain remote logging in TELNET with a neat diagram.	10	L2	CO4

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# CBCS SCHEME

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BEC703

## Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Wireless Communication Systems

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

<b>Module – 1</b>			<b>M</b>	<b>L</b>	<b>C</b>
<b>Q.1</b>	<b>a.</b>	Derive an Expression for Rayleigh Fading Wireless Channel.	<b>10</b>	<b>L2</b>	<b>CO2</b>
	<b>b.</b>	In the wireless Rayleigh fading channel consider a transmit power $P_t$ (dB) = 20 dB. What is the probability that the power at the receiver is greater than $P_r$ (dB) = 10 dB?	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	Explain the modeling of wireless systems with proper equations.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Give the mathematical equations for RMS Delay Based on Average Power Profile.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>Module – 2</b>					
<b>Q.3</b>	<b>a.</b>	Explain the Properties of PN sequences.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Explain any two advantages of CDMA.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>OR</b>					
<b>Q.4</b>	<b>a.</b>	Illustrate OFDM with an example.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	With neat schematic explain MIMO-OFDM Transmitter.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>Module – 3</b>					
<b>Q.5</b>	<b>a.</b>	Explain GSM Network Architecture.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Explain IP-Based Flat Network Architecture.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>OR</b>					
<b>Q.6</b>	<b>a.</b>	Explain Multi Antenna techniques.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Explain LTE Network Architecture with necessary diagram.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>Module – 4</b>					
<b>Q.7</b>	<b>a.</b>	Explain MIMO System Model.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Derive Expression for MIMO Zero-Forcing (ZF) Receiver.	<b>10</b>	<b>L2</b>	<b>CO1</b>

OR

<b>Q.8</b>	<b>a.</b>	Compute the MIMO zero-forcing receiver for the channel matrix H given $H = \begin{bmatrix} 2 & 3 \\ 1 & 3 \\ 1 & 2 \end{bmatrix}$	<b>10</b>	<b>L3</b>	<b>CO2</b>
	<b>b.</b>	Derive expression for MIMO MMSE Receiver.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>Module – 5</b>					
<b>Q.9</b>	<b>a.</b>	With neat diagram, explain design principles of LTE Network.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Explain the Hierarchical Channel Structure of LTE.	<b>10</b>	<b>L2</b>	<b>CO1</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Explain the time domain frame structures of OFDM.	<b>10</b>	<b>L2</b>	<b>CO1</b>
	<b>b.</b>	Explain Uplink SC-FDMA Radio Resources.	<b>10</b>	<b>L2</b>	<b>CO1</b>

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