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

B.Tech SEVENTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-7331 (EL-III) MICROWAVE THEORY AND TECHNIQUES

Time : Three Hours *Maximum Marks : 70*

Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks. All parts of a question must be attempted at the same place.

1(a) Derive the wave equation for TE mode and obtain all the field components in a rectangular waveguide giving suitable diagram.

(b) A rectangular wave guide with dimension of 3cm × 2cm operates in the TM11 mode at 10 GHz. Determine the wave impedance of the rectangular wave guide.

2(a) Derive expressions for cut-off frequency, cutoff wavelength, dominant mode and guided wavelength for TM mode in a rectangular waveguide.

(b) Consider a circular waveguide with a = 0.8 cm. Compute the cut-off frequencies and identify the first four propagation modes.

3(a) Explain the principle of operation of E-Plane-TEE with necessary diagrams and determine the scattering matrix for all possible cases.

(b) Define scattering matrix. Explain various properties of the scattering matrix with suitable expressions.

4(a) Explain the working principle of LASER's giving suitable diagram and give applications of them.

(b) Explain the following microwave components briefly : (i) MASER (ii) PIN Diode.

5(a) Discuss velocity modulation and density modulation in a two-cavity Klystron giving Applegate diagram and derive an expression for the efficiency of a two cavity Klystron amplifier.

(b) Explain the principle of operation of Magnetrons and derive an expression for cut-off magnetic field for a parallel plate Magnetron.

6(a) Draw the block diagram of a microwave bench and explain the function of each block clearly. Explain the process of measuring unknown frequency of a microwave source.

(b) Explain Bolometer and Extended Bolometer methods of microwave power measurements using suitable diagrams.

7(a) Draw and explain the working of a multi-hole directional coupler giving suitable diagram and scattering matrix.

(b) Two directional couplers (20 dB) are used in a guide to sample the incident and reflected powers. The outputs of the two couplers are 3mW and 0.1mW respectively. What is the value of VSWR in the main guide? What is the value of the reflected power?

8 Write short notes on **any two** : (i) Reflex Klystron (ii) Parametric Amplifier (iii) TWT (iv) Hybrid-TEE

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

B.Tech SEVENTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-7341 (EL-IV) MOBILE COMMUNICATION AND NETWORK

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

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

1(a) What is cell splitting? Distinguish between Static and dynamic cell splitting.

(b) Discuss about the planning of a cellular system for a new service area.

2(a) Explain various advantages of a cellular wireless system.

(b) List and discuss about various elements of a cellular system.

3(a) What is Umbrella pattern effect? Explain with suitable example.

(b) What do you mean by UHF TV interference? Explain in detail.

4(a) What do you understand by near cross talk? Discuss about reason of cross talk in cellular system.

(b) Discuss about the mobile point to point prediction model.

5(a) What is meant by gain and pattern relationship? Discuss about its significance in wireless communication system.

(b) What do you mean by equivalent circuit of antenna? Explain.

6(a) What do you mean by frequency spectrum utilization? Explain with reference to cellular mobile communication system.

(b) Distinguish between hard handoff and soft handoff in cellular communication system.

7(a) What is mobile radio integrated system? Explain with suitable examples.

(b) What is meant by multiple access schemes? List and explain in brief.

8 Write a note on **any two** :

(i) Foliage loss (ii) Long distance interference (iii) Forced handoff.

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

B.Tech SEVENTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-7351 (EL-V) SATELLITE COMMUNICATION

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

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

1(a)	What is meant by a communication satellite?	*07*
(b)	State and explain the Kepler's three law of planetary motion.	*07*
2(a)	Draw and explain the depolarization system.	*07*
(b)	What do you mean by earth eclipse of satellite? Explain.	*07*
3(a)	What is transponder? Explain various section of a transponder channel.	*07*
(b)	Write a short note on community antenna TV system.	*07*
4(a)	Explain the various types of transmission losses and discuss about the link power budget equation.	*07*
(b)	Write a short note on Inter-modulation Noise.	*07*
5(a)	What types of antenna configuration are used by VSAT earth station? Explain.	*07*
(b)	Write a detail note on digital DBS-TV system.	*07*
6(a)	What is geostationary satellite? Write the advantages and disadvantages of geo-synchronous satellite.	*07*
(b)	What do you understand by the location of satellite with respect to earth? Also determine the look angle determination.	*07*
7(a)	Discuss in detail about Anik-satellite.	*07*
(b)	What are effective aperture and aperture efficiency? Discuss in detail.	*07*
8(a)	Explain polarization of satellite signal.	*07*
(b)	Write a short note on Apogee and Perigee heights.	*07*

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

B.Tech SEVENTH SEMESTER EXAMINATION JUNE-2025

(Branch : Elx. & Communication Engineering)

EC-7311 INFORMATION THEORY AND CODING

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

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

1(a) Relate the amount of information provided and probability of occurrence of events. ***07***

(b) What is source coding? Define code length and code efficiency. Give the relation between it. ***07***

2(a) A Memory less source emits five messages with probabilities {0.4, 0.2, 0.2, 0.1, 0.}. Find the Shannon-Fano code and determine its efficiency. ***07***

(b) A discrete source emits one of five symbols once every milliseconds with probabilities 1/2, 1/4, 1/8, 1/16 and 1/16. Find the source entropy and information rate. ***07***

3(a) State and explain Shannon Hartley theorem. ***07***

(b) Define : (i) Discrete entropy H(X) & joint entropy H(X,Y) and ***07***

(ii) Mutual information I(X;Y).

Show that $I(X;Y) = H(X) + H(Y) - H(X,Y)$.

4(a) Explain any one coding method used for error correction. ***07***

(b) A (7, 4) cyclic code has a generator polynomial : $g(X) = X^3 + X + 1$. ***07***

Find the codes generated in systematic form.

5(a) Explain different methods of lossless compression, giving their advantages and disadvantages. ***07***

(b) Construct the Huffman code for the following probabilities and also determine the code efficiency : ***07***

{0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625}

6(a) Describe various CCITT compression techniques and give their applications ***07***

(b) What are MPEG compression techniques used for? Describe clearly. ***07***

7(a) Explain different methods of cryptography. ***07***

(b) Describe Rivest–Shamir–Adelman (R-S-A) system of public key cryptography. ***07***

8 Write notes on **any two** : ***14***

(i) Block codes using matrices
(ii) Audio Compression techniques
(iii) Data encryption Standard public key cryptography

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