

CBCS SCHEME

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15EC81

Eighth Semester B.E. Degree Examination, July/August 2022 Wireless Cellular and LTE 4G Broadband

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What are the key enabling features of LTE? (04 Marks)
b. Explain with necessary diagram LTE network architecture. (08 Marks)
c. What are the advantages of OFDM in LTE? (04 Marks)

OR

- 2 a. Explain cellular concept in wireless communication. (04 Marks)
b. Explain effect of fading in communication. (06 Marks)
c. Explain coding and other learning technique with necessary encoder technique. (06 Marks)

Module-2

- 3 a. Explain basics of OFDM. (04 Marks)
b. With necessary block diagram, explain OFDM and OFDM in LTE network. (08 Marks)
c. Explain concept of SC-FDE. (04 Marks)

OR

- 4 a. Explain OFDM-FDMA, TDMA and CDMA. (08 Marks)
b. Briefly explain with diagram, working operation of OFDM. (08 Marks)

Module-3

- 5 a. Explain design principles followed in LTE. (08 Marks)
b. Explain logical and transport channels of LTE. (08 Marks)

OR

- 6 a. Explain convolution turbo coding. (08 Marks)
b. Explain in brief multicast channels of LTE. (08 Marks)

Module-4

- 7 a. Explain uplink control information of LTE physical layer. (08 Marks)
b. Explain formats of PUCCH 1, 1a, 1b, 2a, 2b. (08 Marks)

OR

- 8 a. Explain channel quality indicator and estimation techniques. (08 Marks)
b. Explain non-synchronized random access procedure. (08 Marks)

Module-5

- 9 a. Explain what are the services and functions of PDCP. (08 Marks)
b. Explain HRQ procedure, also in brief give the RRC states with explanation. (08 Marks)

OR

- 10 a. With timing diagram, explain mobility management over the SI interface. (08 Marks)
b. What are the basic approaches to mitigate ICI in downlink? (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

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Eighth Semester B.E. Degree Examination, July/August 2022 Fiber Optics and Networks

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe any five important advantages of optical fiber communication over other communication. (10 Marks)
- b. A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine
- The critical angle at the core-cladding interface.
 - The NA for the fiber.
 - The acceptance angle in air for the fiber. (06 Marks)

OR

- 2 a. With relevant diagrams, explain the different types of optical fibers, considering the refractive index profile, number of modes and material used. (12 Marks)
- b. A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm . If the core refractive index is 1.48, estimate:
- The normalized frequency for the fiber;
 - The number of guided modes. (04 Marks)

Module-2

- 3 a. Derive an expression for r.m.s pulse broadening due to intermodal dispersion in multimode step index fiber. (08 Marks)
- b. Explain different absorption mechanisms in optical fiber. (08 Marks)

OR

- 4 a. Explain the different types of bending losses in optical fiber. (06 Marks)
- b. A step index fiber has a core refractive index of 1.5 and a core diameter of 50 μm . The fiber is jointed with a lateral misalignment between the core axes of 5 μm . Estimate the insertion loss at the joint due to the lateral misalignment assuming a uniform distribution of power between all guided modes when :
- There is a small air gap at the joint ;
 - The joint is considered index matched. (06 Marks)
- c. Explain V-groove optical fiber splices technique. (04 Marks)

Module-3

- 5 a. Derive the expression for quantum efficiency and output power for an LED. (08 Marks)
- b. Describe the different noise sources affecting the photo-detector along with appropriate expressions. (08 Marks)

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OR

- 6 a. Starting from rate equations, derive the expression for the number of photons / unit volume resulting from stimulated and spontaneous emissions in LASER diode. (10 Marks)
- b. Draw and explain two types of front-end amplifier used in optical fiber communication. (06 Marks)

Module-4

- 7 a. Explain the operational principle and implementations of WDM with diagram. (08 Marks)
- b. Describe the working principle of isolators and circulators with suitable diagram. (08 Marks)

OR

- 8 a. Draw the energy-level diagram indicating the transition processes in erbium – doped silica fiber amplifier and explain the amplification mechanism. (06 Marks)
- b. Based on general application, explain three types of optical amplifiers with relevant diagram. (10 Marks)

Module-5

- 9 a. Explain the different types of optical networking node elements. (10 Marks)
- b. Explain ATM protocol architecture. (06 Marks)

OR

- 10 a. Explain public telecommunications networks review with neat diagram. (10 Marks)
- b. Explain an optical packet switching network with neat diagram. (06 Marks)

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15EC833

Eighth Semester B.E. Degree Examination, July/August 2022 Radar Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is Radar? Explain the basic principle of radar. (04 Marks)
b. Explain simple form of Radar Equation. (08 Marks)
c. Explain PRF, PRI, Duty cycle with respect to radar pulse waveform. (04 Marks)

OR

- 2 a. Explain Radar Block diagram. (10 Marks)
b. Explain various applications of RADAR. (06 Marks)

Module-2

- 3 a. Explain detection of signals in noise with reference to minimum detectable signal. (06 Marks)
b. Derive the modified Radar Range Equation by considering the signal to noise ratio. (06 Marks)
c. Explain the probability of False alarm. (04 Marks)

OR

- 4 a. Explain Radar cross section in the case of simple target. (10 Marks)
b. Explain system losses. (06 Marks)

Module-3

- 5 a. Explain simple CW Doppler Radar with the help of block diagram. (06 Marks)
b. Explain MTI Radar Block diagram. (06 Marks)
c. Write short note Delay Line Cancellers. (04 Marks)

OR

- 6 a. Explain Digital MTI processing. (10 Marks)
b. Write a short note on moving target details. (06 Marks)

Module-4

- 7 a. Explain types of tracking radar system. (08 Marks)
b. Explain the tracking of Monopulse Radar in one angle coordinate. (08 Marks)

OR

- 8 a. Explain conical scan tracking radar. (08 Marks)
b. Write short notes on:
(i) Phase-comparison monopulse (04 Marks)
(ii) Sequential lobing. (04 Marks)

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Module-5

- 9 a. Explain the functions of Radar Antenna. (06 Marks)
b. Write short notes on:
(i) Directive gain (05 Marks)
(ii) Antenna Radiation Pattern (05 Marks)

OR

- 10 a. Explain Noise Figure of Networks in Cascade. (06 Marks)
b. Explain Mixer used in superheterodyne radar receiver. (05 Marks)
c. Write short note on Balanced Duplexer. (05 Marks)
