

CBCS SCHEME

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15EC81

Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024 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. Explain briefly EPC Architecture. (08 Marks)
b. Explain Multiantenna technique which supports LTE. (08 Marks)

OR

- 2 a. Explain in brief : i) Fading ii) Sectoring. (08 Marks)
b. Explain Equalizers in brief. (08 Marks)

Module-2

- 3 a. With a neat block diagram, explain OFDM communication system. Also mention the need of timing and frequency synchronization. (09 Marks)
b. Explain SC-FDMA uplink transmitter with a neat figure. (07 Marks)

OR

- 4 a. Explain spatial diversity of multiple antenna techniques. (08 Marks)
b. Explain open-loop MIMO in spatial multiplexing. (08 Marks)

Module-3

- 5 a. Discuss the radio interface protocol stack of LTE. (08 Marks)
b. Write the structure of downlink resource grid and explain the types of resource allocation. (08 Marks)

OR

- 6 a. Write the Frame structure Type 2 and explain the various fields applicable to TDD mode. (08 Marks)
b. Discuss the Broadcast channels and multicast channels. (08 Marks)

Module-4

- 7 a. Explain in brief : i) Frequency hopping ii) Multiantenna transmission. (08 Marks)
b. Explain Non – synchronized Random Access procedure. (08 Marks)

OR

- 8 a. Explain CQI feedback in brief. (08 Marks)
b. Explain the cell search process in LTE. (08 Marks)

Module-5

- 9 a. Explain the main services and functions of PDCP sublayer for the user plane. (08 Marks)
b. Explain RRC states and its functions. (08 Marks)

OR

- 10 a. Explain mobility management over the S1 transfer. (08 Marks)
b. Explain three basic approaches to mitigate ICI in downlink. (08 Marks)

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.

CBCS SCHEME

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15EC82

Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024 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. What are the advantages of optical fiber communication? (04 Marks)
- b. Explain the photonic crystal fiber with cross-sectional end view of the structure of an index guiding photonic crystal fiber. (06 Marks)
- c. A silica 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:
 - i) The critical angle in air for the fiber
 - ii) The numerical aperture for the fiber
 - iii) The acceptance angle in air for the fiber. (06 Marks)

OR

- 2 a. With suitable structures give comparison of conventional single mode and multi mode step index and graded index optical fibers. (06 Marks)
- b. Explain briefly about fiber materials used in optical communication. (06 Marks)
- c. A multimode step index fiber with a core diameter of 80 μ m and a relative index difference of 1.5% is operating at a wavelength of 0.85 μ m. If the core refractive index is 1.48.
Estimate:
 - i) The normalized freq. for the fiber
 - ii) The number of guided modes. (04 Marks)

Module-2

- 3 a. Explain about material absorption losses in an optical fiber. (06 Marks)
- b. Explain the significance of fiber connector with relevant diagram explain the function of cylindrical ferrule connector. (06 Marks)
- c. A glass fiber exhibits material dispersion given by $|\lambda^2(d^2n_1/d\lambda^2)|$ of 0.025. Determine the material dispersion parameter at a wavelength of 0.85 μ m and estimate the rms pulse broadening per kilometer for a good LED source with an rms spectral width of 20nm in this wavelength. (04 Marks)

OR

- 4 a. Explain the fiber bend loss with relevant diagram and expressions. (06 Marks)
- b. Explain intermodal dispersion. With suitable diagram show the paths taken by the axial and an extreme meridional ray in a perfect multimode step index fiber. (06 Marks)
- c. Write a note on fiber splices. (04 Marks)

Module-3

- 5 a. Draw the diagram of a typical GaAlAs double Hetrostructure LED along with energy band diagram and refractive index profile and explain. (10 Marks)

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- b. Explain the terms :
- (i) Spontaneous emission
 - (ii) Stimulated emission
 - (iii) Quantum efficiency.

(06 Marks)

OR

- 6 a. Explain Fabry–Perot resonator cavity of laser with a neat diagram. (06 Marks)
- b. Briefly discuss the possible sources of noise in optical fiber receiver. (06 Marks)
- c. A GaAs laser operating at 850nm Los 560 μ m length and refractive index $n = 3.7$. What are the frequency and over length spacing's? (04 Marks)

Module-4

- 7 a. Explain the operational principle and implementations of WDM with diagram. (08 Marks)
- b. Explain polarization independent Isolator with a neat diagram. (08 Marks)

OR

- 8 a. Explain optical circulators and optical add/drop multiplexers in detail. (06 Marks)
- b. Explain the amplification mechanism in EDFA amplifier with the help of energy band diagram. (10 Marks)

Module-5

- 9 a. Explain public telecommunication network review with neat diagram. (08 Marks)
- b. Explain an optical packet switched network with neat diagram. (08 Marks)

OR

- 10 a. Explain the concept of optical burst switching. (08 Marks)
- b. Explain the different types of optical networking node elements. (08 Marks)
