C   **Reg. No. :** ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U7402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Seventh Semester

Electronics and Communication Engineering

21UEC702- OPTICAL AND MICROWAVE COMMUNICATION

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. The most common light used in fiber-optic links is   CO 1 - U

   (a) Infrared   (b) Red   (c) Violet   (d) Ultraviolet

2. With respect to single mode and graded index fibers, which parameter specifies   CO 1 - U
   the propagation of polarization modes with different phase velocities & the
   difference between their effective refractive indices?

   (a) Mode field diameter   (b) Birefringence

   (c) Fiber beat length   (d) Spot Size

3. Microwave is a region of Electromagnetic spectrum having frequency   CO 1 - U
   ranging from __

   (a) 300 MHz to 300 GHz   (b) 1Hz to 100 Hz

   (c) 1Hz to 100 GHz   (d) None of the mentioned

4. Progress in_and other related semiconductors material processing led to   CO 1 - U
   the feasibility of monolithic microwave integrated circuits.

   (a) GaAs   (b) Silicon   (c) Germanium   (d) GaAlAs

5. In Microwave power measurements using bolometer, the principle of working is   CO 1 - U
   the variation of _____.

   (a) Inductance with absorption of power

   (b) Resistance with absorption of power

   (c) Capacitance with absorption of power

   (d) Cavity dimensions with heat generated by the power

PART – B (5 x 3= 15 Marks)

6. Calculate the acceptance angle of a step index fiber in air has a numerical aperture of 0.26 in air for skew rays that change direction by 105^0 at each Reflection.   CO2 - App

7. Two polarization maintaining fibers operating at a wavelength of 1.3 μm have beat length of 0.7mm. Determine modal birefringence.   CO 3 -App

8. State the characteristics of magnetron and of 2-cavity klystron amplifier.   CO 1 - U

9. Differentiate MMIC and conventional ICs.   CO 1 - U

10. Mention the EMI/EMC interferences in Microwave applications.   CO 1 - U

PART – C (5 x 16= 80 Marks)

11. (a) Explain the features of multimode and single mode step index fiber and compare them.   CO 1 - U   (16)

Or

(b) Illustrate the working principle of step index and graded index fibers with a neat diagram.   CO 1 - U   (16)

12. (a) Explain in detail about the scattering and bending losses that occur in an optical fiber with relevant diagram and expressions.   CO 1 - U   (16)

Or

(b) Express the linear and nonlinear scattering losses in optical fiber system.   CO 1 - U   (16)

13. (a) Apply the principle of velocity and current modulation in the Reflex Klystron tube to generate microwaves, in applications such as satellite systems .   CO 4-App   (16)

Or

(b) A two cavity klystron operates at 5 GHZ with dc beam voltage 10KV, cavity gap 2mm. For a given input RF voltage, the magnitude of the gap voltage is 100V. Calculate the transit time at the cavity gap, the transit angle and velocity of electrons leaving the gap.   CO 4 -App   (16)

14. (a) Explain the different types of materials used in MMIC and list their characteristics   CO 1 - U   (16)

Or

(b) Summarize in detail about the various Conductive materials used in Monolithic microwave integrated circuit and explanation its application.   CO 1 - U   (16)

15. (a) Explain in detail with block diagram about the measurement of VSWR through return loss measurement, Justify the suitable measurement technique.   CO 1 - U   (16)

Or

(b) Interpret in detail how power is measured at microwave frequencies.   CO 1 - U   (16)

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