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N.B.: (1) Question No. 1 is compulsory.

- (2) Attempt any **four** questions from remaining **six** questions. 2.30 to 5.30 P.M.
- (3) **Figures** to the right indicate **full marks**.

1. Answer any **four** of the following :—
 - (a) Why TEM mode does not exist in hollow waveguide ? 5
 - (b) Compare p-i-n and p-n photodiode. 5
 - (c) Draw refractive index profile diagram of step Index and graded Index fiber. 5
 - (d) What is dispersion in optical fiber ? How does it affect the performance of optical fiber ? 5
 - (e) Describe stimulated emission in Laser. 5
2. (a) Differentiate between TWT Amplifier and Klystron Amplifier. 8
 (b) Draw the schematic diagram of cylindrical mode of magnetron and explain its principle of operation. Explain phase bunching process. 12
3. (a) A rectangular waveguide has the following characteristics :— 10
 $a = 3 \text{ cm}$, $b = 1.5 \text{ cm}$, $\mu_r = 1$, $\epsilon_r = 2.25$
 Calculate : (i) the cut-off frequency for TE_{10} mode.
 (ii) the cut-off wavelength for TE_{10} mode.
 (iii) the guided wavelength at a frequency of 4 GHz.
 (b) Discuss the methods of exciting TE_{10} and TE_{20} mode's in a rectangular waveguide. 10
4. (a) Discuss the limitations of conventional Vacuum tube's at microwave frequencies. 5
 (b) Describe the operation of Gunn diode. 5
 (c) Compare E-Tee and H-Tee. 5
 (d) Give the significance of coupling factor's and directivity of directional Coupler. 5
5. (a) The quantum efficiency of a particular A.P.D is 0.8 for the detection of radiation at a wavelength of $0.9 \mu\text{m}$. When the incident power is $0.5 \mu\text{W}$, the output current from the device is $11 \mu\text{A}$. 6
 Determine : (i) the responsivity of photodiode.
 (ii) photo current in photo diode.
 (iii) multiplication factor of photodiode.
 (b) Compare LED and LASER optical source. 5
 (c) What is the cut-off wavelength as applied to optical fibers ? 4
 (d) State the requirements for a good connector. 5
6. (a) With the help of neat diagram explain any one method of fabricating an optical fiber. 10
 (b) Explain various types of Splicing techniques. 10
7. (a) Discuss homojunction and heterojunction structures. 5
 (b) With the help of neat diagram explain the operation of surface emitting LED and edge emitting LED. 10
 (c) Explain any one method of measuring attenuation in optical fiber. 5