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(February)

ELECTRONICS

(Honours)

(**Optical Fiber and Optical Communication, Pulse Modulation, Microwaves, Power Electronics**)

[ELEC-502 (T)]

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **four** questions, taking **one** from each Unit

UNIT—I

1. (a) Explain briefly with the help of a suitable diagram, the following in relation to an optical fibre : $1\frac{1}{2}+2+1\frac{1}{2}=5$
- (i) Snell's law of refraction
- (ii) Total internal reflection and critical angle

- (b) An optical fibre has the following characteristics :

Fibre index $n_1 = 1.36$ and

(refractive index difference) = 0.025

Calculate the numerical aperture and the acceptance angle. $1\frac{1}{2}+1\frac{1}{2}=3$

- (c) Classify optical fibres according to the way light is propagated. Explain each of them briefly. 6

2. (a) Discuss briefly the three major causes of light losses in a fibre. 5

- (b) What is intermodal dispersion? Explain with necessary diagram. 4

- (c) Explain why the refractive index of core should be more than the cladding. Give the block diagrammatic representation of optical fibre communication system. 5

UNIT—II

3. (a) Describe briefly pulse-time modulation scheme in communication with suitable diagram. 6

- (b) Write short notes on LDR and photodiode. $4+4=8$

(3)

4. (a) Explain briefly pulse-width modulation scheme of communication with a suitable diagram. 6
- (b) Write short notes on PAM and quantization. 4+4=8

UNIT—III

5. (a) Draw the electromagnetic spectrum mentioning the different frequency ranges. 2
- (b) What are the normal frequency range and wavelength for microwaves? Mention also the name of the different bands of microwave with their frequency range. 3
- (c) Discuss certain effects which become pronounced at microwave frequencies. 3
- (d) Discuss briefly the characteristics of microwave frequency. 6
6. (a) What is transferred electron effect in Gunn diode? 2
- (b) Draw a neat band structure and the velocity versus field characteristic curve of Gunn diode. 3
- (c) Explain how negative differential mobility is realized using Maxwell's equation in Gunn diode. 3

(4)

- (d) What are the three important time parameters in a Gunn diode? 4
- (e) Draw a schematic diagram of a Gunn diode oscillator. 2

UNIT—IV

7. (a) What is power electronics? 2
- (b) What are the different types of power conversions that are relevant to power electronics? 4
- (c) What do you understand by safe operating area (SOA) of a power transistor? 4
- (d) Discuss the various timings arising in a power BJT when it is switched ON. 4
8. (a) Explain the $V-I$ characteristics of an SCR. 2
- (b) Explain the use of an SCR as a full wave-controlled rectifier. 4
- (c) Discuss one application of a TRIAC. 4
- (d) Draw the $V-I$ characteristics of a TRIAC and a DIAC. 2
- (e) Draw the block diagram of an SMPS. 2

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