

[Total No. of Questions - 8] [Total No. of Printed Pages - 2]
(2125)

15413

M. Tech 3rd Semester Examination
Microwave and Opto-Electronic Devices
EC-309

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt any five questions.

(ii) Attempt all the parts of the question at one place.

1. (a) What is velocity modulation? How is it achieved in a two cavity Klystron? Describe the construction and working of reflex klystron. (10)
- (b) Prove the condition for negative conductance on the slope of V-I characteristic of Gunn diode. (5)
- (c) Explain the basic structure of avalanche diode. (5)
2. (a) How to choose the substrate material for MICs? (6)
- (b) A Gunn diode has a drift length of $2\mu\text{m}$. What minimum voltage is required to initiate the Gunn mode? (4)
- (c) Explain the schematic diagram of Microstrip line. Also explain its Limitations (10)
3. (a) Explain hybrid fabrication technique for MICs. (10)
- (b) An X-band pulsed cylindrical magnetron has the following parameters: $V_0 = 30\text{kV}$, $I_0 = 90\text{A}$, $B_0 = 0.01\text{Wb/m}^2$, $a=4\text{cm}$ and $b=8\text{cm}$. Calculate (i) the cyclotron angular frequency (ii) Cut off magnetic field. (5)

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2

15413

- (c) Explain the concept of bunching in Travelling wave tube. (5)
4. (a) Explain the principle and working of Liquid crystal display (10)
- (b) Differentiate between electronchromic display and electrophoresis display. (10)
5. (a) Write short notes on following:
 - (i) Schottky barrier solar cell.
 - (ii) Thin film and amorphous silicon solar cell. (10)
- (b) Discuss the principle and working of Plasma Display. Explain its advantages. (10)
6. (a) Which solar panel is best: Mono-crystalline, polycrystalline or thin film? Explain reasons. (10)
- (b) What is the need of integration of opto-Electronic devices? (10)
7. (a) A two cavity klystron has following parameters: $V_0 = 1200\text{V}$, $I_0 = 25\text{mA}$, $R_0 = 30\text{k}\Omega$, $f = 10\text{GHz}$, $d = 1\text{mm}$, $L = 4\text{cm}$, $R_{\text{sh}} = 30\text{k}\Omega$. Calculate (i) the input voltage for maximum output voltage (ii) the voltage gain in dB (iii) Efficiency. (10)
- (b) Give the construction of Magnetron. Derive Hall cut -off voltage equation and explain the process of generation of microwaves by cavity magnetron operated in π -mode. (10)
8. (a) Discuss the operation and applications of BARRITT Diode. (10)
- (b) Discuss the working principle of backward diode and its advantages in Microwave. (10)