

1058  
B.E. (Electronics and Communication Engineering )  
Sixth Semester  
EC-608: Microwave Engineering (Old)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

X-X-X

| Section-A |  |         |
|-----------|--|---------|
| 1         | a) Define phase focusing effect.<br>b) What is velocity modulation?<br>c) What is Gunn Effect?<br>d) Differentiate bend and twists.<br>e) Why EH plane Tee is known as magic Tee?<br>f) Give the classification of VSWR.<br>g) What is parametric amplifier?<br>h) Define quality factor of waveguide.<br>i) Write two applications of strip lines.<br>j) Define dominant mode of a waveguide. | 1x10=10 |
| Section-B |  |         |
| 2         | a) Compare bipolar transistors for microwave operation to FETs. What are the differences in operating theory in performance? What are the benefits of each?<br>b) What is a directional couple? Derive the scattering matrix for a directional coupler.  | 6<br>4  |
| 3         | a) Give classification of power measurement, with diagram explain different power measurements methods.<br>b) In an H-plane T-junction, compute power delivered to the loads 40 ohm and 60 ohm connected to arms 1 and 2 when 10 mW powers is delivered to matched port 3.   | 6<br>4  |
| 4         | a) Define Faraday rotation; explain working of precision rotary phase shifter.<br>b) Describe the several domain formation modes of a Gunn diode.  | 5<br>5  |
| Section-C |  |         |
| 5         | a) Explain the operating principle and working of IMPATT and TRAPATT diode.<br>b) A travelling-wave tube (TWT) operates under the following parameters; beam voltage 3 kV, beam current 30 mA, characteristics impedance of helix $10 \Omega$ , circuit length 50 and frequency is 10 GHz. Determine the output power gain and all propagation constants.                                      | 5<br>5  |
| 6         | a) What are the limitations of conventional tubes at microwave frequencies?<br>b) A pulsed cylindrical magnetron is operated with the following parameters; anode voltage 25 kV, beam current 25 A, magnetic density $0.34 \text{ Wb/m}^2$ , radius of cathode cylinder 5 cm and radius of anode cylinder is 10 cm, calculate the cut-off magnetic flux density.                               | 5<br>5  |
| 7         | a) Starting from the basic principles derive an expression for the efficiency of a two cavity klystron amplifier.<br>b) Differentiate strip line and microstrip line. Discuss different types of strip line  | 6<br>4  |

X-X-X