

Total No. of Questions : 8]

SEAT No. :

P3045

[5154]-613

[Total No. of Pages : 3

B.E.(E&TC)

MICROWAVE ENGINEERING

(2012 Pattern) (Semester-I) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data, if necessary.

Q1) a) Why waveguides are required at microwave frequencies? Explain the following parameters of a waveguide. [7]

- i) Phase Velocity
- ii) Guide wavelength
- iii) Cut off frequency

b) Explain the Faraday's rotation principle? Explain in brief the working principle of an isolator. [7]

c) Explain the properties of E plane Tee with the help of a neat diagram. Also state its Scattering matrix. [6]

OR

Q2) a) An air-filled rectangular waveguide of inside dimensions 7×3.5 cm operates in the dominant TE mode. [7]

- i) Find the cut off frequency
- ii) Determine the phase velocity of the wave in the guide at frequency of 3.5 GHz.
- iii) Determine the guided wavelength at the same frequency.

b) Define with expressions the following parameters of directional coupler. [7]

- i) Coupling Factor
- ii) Directivity
- iii) Insertion loss
- iv) Isolation

c) When is it necessary to carry out Microwave Network Analysis? [6]

P.T.O.

- Q3)** a) What are the high frequency limitations of transistor? Explain the techniques to minimize this along with the performance parameters of transistor at high frequency. [9]
- b) Explain in detail the construction, operation, advantages and applications of a TWT amplifier. [9]

OR

- Q4)** a) A two cavity Klystron amplifier has the following specifications: [10]
Beam Voltage: $V_0=1000V$
Beam Current: $I_0=25mA$
Frequency: $f=3\text{ GHz}$
Gap spacing in either cavity: $d=1\text{ mm}$
Spacing between centers of cavities: $L=4\text{ cm}$
Effective shunt impedance excluding beam loading: $R_{sh} : 30k\Omega$
Determine:
i) The input gap voltage to give maximum output voltage V_2
ii) Find voltage gain, neglecting the beam loading in the output cavity.
iii) Find the efficiency of the amplifier, neglecting beam loading.
- b) What are cross field devices? Explain the Cavity Magnetron with Hull cut off condition in detail. [8]

- Q5)** a) Explain the working principle, advantages and disadvantages of Tunnel Diode in detail. [8]
- b) Draw equivalent circuit of Varactor diode. Explain in detail its construction and operation. [8]

OR

- Q6)** a) Explain construction, working and applications of PIN diode in detail. [8]
- b) Write a short note on: [8]
i) Microwave Transistor
ii) Schottky Barrier diode.

- Q7)** a) Explain attenuation measurement technique in detail. [8]
b) Enlist methods of measuring the Q of a cavity resonator. Explain any one method in detail. [8]

OR

- Q8)** a) Write short note on: [8]
i) Tunable detector
ii) Microwave Power Measurement
b) Explain any two methods of measuring Impedance of a terminating load in a microwave system. [8]

