QP Code: RM21BTECH455 | Reg. No | | | | | | | | | | | AY 21

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Sixth Semester Regular) Examinations, May – 2024

21BECPC36002 - Microwave Engineering

(ECE)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Differentiate between phase velocity and group velocity with expressions.	CO1	K1
b. A 5 dB attenuator is specified with a VSWR of 1.2. Assuming attenuator is reciprocal, find S_{11}.	CO2	K3
c. Write down the S-Matrix of Magic Tee / Hybrid Tee.	CO2	K1
d. What is the role of helix inside a TWT?	CO4	K2
e. Draw the Applegate Diagram.	CO4	K1

PART – B **(15 x 4 = 60 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Explain in detail with proper derivation about single stub matching	10	CO1	K3
b. Define reflection coefficient, return loss, VSWR and establish relationship between them.	5	CO1	K3
(OR)			
c. A distortion less transmission line operating at 100 MHz frequency has Z_0=60 ohm, α=0.02 Np/m, phase velocity=0.6c {c is the velocity of light} . Find the Conductance and resistance value.	7	CO1	K3
d. If the conductors of a transmission line are perfect and Z_0=50 ohm and β=100 rad/m. Find out resistance, inductance, capacitance and conductance.	8	CO1	K3
3.a. Find the cut-off frequency for th TE12 mode in a hollow rectangular waveguide whose dimensions are i) a= 2.286 cm and b= 1.016 cm ii) b= 2.286 cm and a= 1.016 cm {a is the broad dimension and b is the narrow dimension}	7	CO2	K3
b. A hollow rectangular waveguide operates at the frequency of 1 GHz and it has dimensions of 5 cm ×2 cm. Check about the propagation of $TE_{21}$with proper calculations.	8	CO2	K3
(OR)			
c. Explain about the microwave circulator and isolators with proper diagram and expressions.	10	CO2	K2
d. Differentiate between E-Plane, H-Plane and Magic Tee with diagram and S-Matrix.	5	CO2	K2

4.a.	Explain with proper diagram about the operating principle of Reflex Klystron.	8	CO3	K3
b.	Explain about the construction and Operation of Schottky Barrier Diode (SBD).	7	CO3	K2
	(OR)			
c.	Explain the mechanism in 8-Cavity magnetron with diagram.	5	CO3	K2
d.	Explain in detail about TWT Structures with diagram and expressions. What are its applications ?	10	CO3	K2
5.a.	Explain about MASER with proper diagram. Which materials are used for MASER? What are the applications of MASER ?	10	CO4	K1
b.	Explain in detail about negative resistance with the help of VI characteristic .	5	CO4	K1
	(OR)			
c.	Design a rectangular patch antenna by calculating length and width operating at 2.4 GHz whose substrate has a dielectric constant of 4.4 with a height of 1.6 mm.	10	CO4	K3
d.	Why patch antenna is widely used? Explain about it along with its applications with diagram.	5	CO4	K1

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