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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

B. Tech Degree Examinations, December – 2020

(Seventh Semester)

BECPC7010 - HIGH FREQUENCY ENGINEERING

(Electronics and Communication Engineering)

Time: 2 hrs

Maximum: 50 Marks

The figures in the right hand margin indicate marks.**PART – A: (Multiple Choice Questions)****(1 x 10 = 10 Marks)****Q.1. Answer ALL questions**

[CO#] [PO#]

- | | | |
|---|-----|--|
| a. When a transmission line has a load impedance same as that of the characteristic impedance, the line is said to be_____ | CO3 | PO1 |
| (i) Parallel | | (ii) Perpendicular |
| (iii) Polarized | | (iv) Matched |
| b. A waveguide is also a _____ | CO3 | PO1 |
| (i) Low pass filter | | (ii) Band stop filter |
| (iii) High pass filter | | (iv) Band pass filter |
| c. A frequency at which microwave ovens operate is_____ | CO2 | PO1 |
| (i) 50 μ Hz | | (ii) 3.3 GHz |
| (iii) 4.5 GHz | | (iv) 2.45 GHz |
| d. A waveguide has a cut-off frequency of 17 GHz. Which of the following signals will not be passed by the waveguide? | CO3 | PO3 |
| (i) 15 GHz | | (ii) 18 GHz |
| (iii) 22 GHz | | (iv) 255 GHz |
| e. A microwave device which allows RF energy to pass through in one direction with very little loss, but absorbs RF power in the opposite direction | CO3 | PO1 |
| (i) Circulator | | (ii) Multiplexer |
| (iii) Isolator | | (iv) Wave trap |
| f. In a directional coupler | CO4 | PO1 |
| (i) isolation (dB) equals coupling plus directivity | | (ii) coupling (dB) equals isolation plus directivity |
| (iii) isolation (dB) equals (coupling) (directivity) | | (iv) directivity (dB) equals isolation plus coupling |
| g. Which of the following can be used for amplification of microwave energy? | CO2 | PO1 |
| (i) Travelling wave tube | | (ii) Magnetron |
| (iii) Reflex Klystron | | (iv) Gunn diode |
| h. Directivity is inversely proportional to ____ | CO3 | PO1 |
| (i) HPBW | | (ii) Beam width |
| (iii) FNBW | | (iv) Beam area |
| i. Effective aperture is always __ than Physical aperture. | CO3 | PO1 |
| (i) Higher | | (ii)) lower |
| (iii) Both a and b | | (iv) none |
| j. What is the nature of radiation pattern of an isotropic antenna? | CO3 | PO1 |
| (i) Spherical | | (ii) Elliptical |
| (iii) Dough-nut | | (iv) Hyperbolic |

PART – B: (Short Answer Questions)**(2 x 5 = 10 Marks)**Q.2. Answer ALL questions

	[CO#]	[PO#]
a. Difference between Microwave transistors and Transferred Electron Devices?	CO1	PO2
b. Name the types of magnetron?	CO2	PO1
c. For an X band rectangular waveguide find λ_c ?	CO3	PO1
d. What are the basic types of directional couplers?	CO4	PO3
e. What is the purpose of slow wave structures used in TWT amplifiers?	CO2	PO1

PART – C: (Long Answer Questions)**(6 x 5 = 30 Marks)**Answer ANY FIVE questions

	Marks	[CO#]	[PO#]
3. Name different electromagnetic frequency spectrum region and microwave band designations?	(6)	CO3	PO1
4. Explain about different type of transmission lines?	(6)	CO3	PO1
5. Derive the expression for cut off frequency of the rectangular wave guide.	(6)	CO3	PO1
6. An air filled rectangular wave guide has dimensions of $a = 6$ cm and $b = 4$ cm. The signal frequency is 3 GHz. Compute the following for TE_{10} mode: i) Cut-off frequency ii) Wavelength in the waveguide iii) Phase constant iv) Wave impedance.	(6)	CO3	PO1
7. A reflex klystron operates with $V_0 = 500$ V, $R_{sh} = 20$ K Ω , $F_r = 8$ GHz, $L = 1$ mm, $n = 2$ mode. Find i) The direct current necessary to give a gap voltage of 200 V ii) Calculate the electronic efficiency	(6)	CO2	PO2
8. Demonstrate the construction of Schottky Barrier diode and its operation.	(6)	CO1	PO1
9. Explain Construction and operation of Gunn diode with RWH Theory	(6)	CO1	PO1
10. Explain the salient and the constructional features of a microstrip antenna.	(6)	CO3	PO1

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