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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, NOVEMBER 2022

Fourth Semester

Core Course—MICROWAVE ELECTRONICS

(For B.Sc. Electronics)

[2013—2016 Admissions]

Time : Three Hours Maximum Marks : 80

Part A

Answer **all** *questions.*

Each question carries 1 *mark.*

1. When a particular mode is excited in a waveguide, there appears an extra electric component in the direction of propagation. The resulting mode is ————.
2. Ferrite isolators may be based either on ———— or on resonant absorption.
3. A ———— bend is a piece of waveguide smoothly bent in a plane parallel to the magnetic field for the dominant mode.
4. In a klystron, velocity modulation takes place in the ————.
5. A multi-cavity klystron is not a good low-level amplifier because of ————.
6. For Gunn Effect, the mobility of the upper valley must be ————.
7. ———— Diode is a transferred electron device.
8. A parametric amplifier has an input and output frequency of 2.25 GHz, and is pumped at 4.52 GHz. It is a ———— amplifier.
9. IMPATT stands for ————.
10. Negative resistance is obtained with a Gunn diode because of ————.

(10 × 1 = 10)

Turn over

Part B

Answer any **eight** *questions.*
Each question carries 2 *marks.*

11. Name any four important semiconductor microwave devices.
12. What are the advantages of Travelling Wave Tubes (TWT) ?
13. What is the need of an isolator ?
14. What is the function of a slow wave structure in TWT ?
15. What is Backward Wave Oscillator (BWO) ? State the applications of BWO.
16. What is the need of a Twist ?
17. What is the operating frequency of TRAPATT devices ?
18. What are the applications of Gunn Diode ?
19. What are parametric amplifiers ?
20. What are the applications of reflex klystron?
21. Define characteristic impedance.
22. Which mode is called the dominant mode of the waveguide? Also write the expressions for its cut-off frequency and wavelength.

(8 × 2 = 16)

Part C

Answer any **six** *questions.*
Each question carries 4 *marks.*

23. Explain the operation of Schottky barrier diode.
24. Briefly explain the amplification mechanism in parametric amplifiers.
25. Explain the operation of the reflex klystron oscillator. Why is the transit time so important in this device ?
26. Explain about the various types of directional coupler.
27. Discuss briefly the methods of beam focussing in traveling wave tubes.
28. Explain in detail about isolators.
29. What is the effect of using a dielectric inside a cavity resonator? Explain with an example.

30. Give the comparison between two cavity klystron amplifier and travelling wave tube.

31. Differentiate TM and TEM waves.

(6 × 4 = 24)

Part D

Answer any **two** *questions.*

Each question carries 15 *marks.*

32. Explain the operation and construction of IMPATT diode.

33. Discuss briefly what is meant by coaxial, frequency-agile and voltage-tuneable magnetrons.

34. What are cavity resonators? What application do they have ? Why do they normally have odd shapes ? Explain.

35. What are the power capabilities and practical applications of the various types of Travelling-Wave Tubes? What are the major advantages of CW and pulsed TWTs ?

(2 × 15 = 30)