

- (b) Explain the function of A-scope and PPI display in connection to radar. **5**
7. Explain the following terms : **15**
- (i) Pulse repetition frequency
 - (ii) System losses
 - (iii) Propagation effects
 - (iv) Minimum detectable signal.
8. (a) With the help of suitable diagram, discuss in brief about operation of FM-CW Radar. **7.5**
- (b) Discuss working of multiple frequency CW Radar. Also write its applications. **7.5**

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Roll No.

F-22

B. Tech. EXAMINATION, May 2017

(Sixth Semester)

(B. Scheme) (Main & Re-appear)

(EEE, ECE)

ECE-302-B

Microwave and Radar Engg.

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Use of calculators is allowed.

M-F-22

4

530

(2-43/3) M-F-22

P.T.O.

1. (a) Compare waveguide and transmission lines from the point of view of frequency limitations, attenuation, spurious radiation and power handling capacity.
- (b) A rectangular waveguide is filled by dielectric material of $E_r = 9$ and has inside dimensions of $7 \text{ cm} \times 3.5 \text{ cm}$. It operates in dominant mode :
 - (i) Determine the cutoff frequency
 - (ii) Find the phase velocity in the guide at a frequency of 2 GHz
 - (iii) Find the guide wavelength at the same frequency.
2. (a) What are Cavity Resonators ? Derive the equation for resonant frequency for a rectangular cavity resonator. **7.5**
- (b) How does an isolator differ from an attenuator ? Explain the various types of ferrite isolators with suitable diagrams. **7.5**
3. Briefly describe, with the help of a sketch, the principle of operation of a cavity magnetron oscillator. What is the dominant mode of operation in such a device ? How do we ensure operation at the dominant mode ? **15**
4. (a) Explain construction and working of a TRAPATT diode. **7.5**
- (b) Explain with a suitable diagram the working of MASER. Mention its applications. **7.5**
5. (a) Describe with necessary block schematic for power measurement using a bolometer. **7.5**
- (b) Calculate the SWR of transmission system operating at 10 GHz. Assume TE_{10} wave transmission inside a waveguide of dimension $a = 4\text{m}$, $b = 2.5 \text{ cm}$. The distance measured between twice minimum power point = 1 mm on a slotted line.
6. (a) Derive the basic radar range equation as governed by the minimum detectable signal. How does the selection of threshold level affect the performance of a radar system ? **10**