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Total No. of Pages: 02  
Total No. of Questions: 09

**B. Tech. (ECE, ETE) (Sem.-5<sup>th</sup>, 6<sup>th</sup>)**  
**MICROWAVE AND RADAR ENGG**

Subject Code: BTEC-601

Paper ID: [A2315]

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATE:**

1. Section-A is compulsory.
2. Section-B Attempt any four questions.
3. Section-C Attempt any two questions.

**SECTION-A**

**Q. 1.** Answer the following:

(10x2=20)

- (a) What are the limitations of conventional tubes?
- (b) What are the advantages of crossed field amplifiers?
- (c) Write down the role of delay line cancellers?
- (d) What are the limitations of BWO?
- (e) Write down ferrite devices and their properties?
- (f) Discuss the characteristics of varactor diode.
- (g) What rat race junction?
- (h) Why TEM waves are not propagated in waveguides?
- (i) What are skin effect losses?
- (j) What are the properties of S parameters?

**SECTION-B**

(4x5=20)

- Q. 2.** What do you understand by linear beam tubes (O type). Explain the working principle of BWO.
- Q. 3.** Explain Faraday rotation in ferrite with the help of isolator construction and operating principle.
- Q. 4.** Write the performance characteristics and limitation of microwave transistors with respect to current, voltage and power.
- Q. 5.** Derive RADAR range equation and explain the factors that affect maximum range of RADAR.
- Q. 6.** Explain canonical scan tracking RADAR system with the help of block diagram.

### SECTION-C

(2x10=20)

Q. 7. (a) Draw the block diagram of pulsed RADAR system and explain functions of each building block.

(b) Calculate maximum range of RADAR system which operates at 3 cm with  $P_t=600\text{KW}$ ,  $S_{\min}=10^{-13}\text{W}$  and  $A_e=5\text{m}^2$  where  $\sigma=20\text{m}^2$ .

Q. 8. Explain PIN diode with the help of zero bias, reverse bias and forward bias. Also explain its application as a switch, amplitude modulator and phase shifter.

Q. 9. An X-band pulsed cylindrical magnetron has the following operating parameters:

Anode voltage :  $V_0 = 26\text{KV}$

Beam current :  $I_0 = 27\text{A}$

Magnetic flux density :  $B_0 = 0.336\text{Wb/m}^2$

Radius of cathode cylinder :  $a = 5\text{cm}$

Radius of vane edge to centre :  $b = 10\text{cm}$

Compute:

- (a) The cyclotron angular frequency.
- (b) The cut-off voltage for a fixed  $B_0$
- (c) The cut-off magnetic flux density for a fixed  $V_0$

.....END.....