Q.P. Code : 788801

(3 Hours)   **Total Marks : 80**

Note :1. Question **No. 1** is **compulsory**.
   2. Out of remaining questions, attempt **any three** questions.
   3. Assume suitable additional data if required.
   4. Figures in brackets on the right hand side indicate full marks.

1. a) Why are transferred electron devices able to operate at higher frequencies than bipolar transistors. **5**

   b) Explain the principle of working of a quarter wave transformer. **5**

   c) Explain the terms frequency pushing and frequency pulling with reference to magnetron. **5**

   d) How long does it take for the radar signal to travel out and back when the target is at maximum unambiguous range. **5**

2. a) An air filled circular waveguide having an inner radius of 1 cm is excited in the dominant mode at 10 GHz. Find·(i) the cut off frequency of the dominant mode (ii) guide wavelength (iii) wave impedance. Find the bandwidth for operation in dominant mode only. **10**

   b) Describe operation of following devices using faraday's rotation principle. **10**
      (i) Isolator (ii) Gyrator

3. a) Calculate the position and length of short circuited stub design to match $(200+j300)\Omega$ load to a transmission line whose characteristic impedance is 300Ω (Use Smith chart) **10**

   b) What are '0' type tubes? Explain. **10**
      A TWT operates under following parameters,
      Beam Voltage : 10KV
      Beam Current : 500mA
      Characteristic impedance of helix : 25Ω
      Circuit length : 20cm
      Frequency : 4GHz
      Determine gain parameter and power gain.

4. a) Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for the bunched beam current. Also find out the condition for maximum power output. **10**

   b) Explain the operation of basic parametric device. Is it phase dependent. What are the relationships of the signal, pump and idler frequencies for a parametric amplifier with an idler circuit operated as a degenerate amplifier. **10**

[TURN OVER]

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5. a)   Draw the functional block diagram of an MTI radar system and explain its **10**
         operation. Define the terms range tracking and MTI improvement factor.

    b)   Draw the block diagram of an amplitude comparison monopulse tracking radar **10**
         and explain its principle of operation.

6. Write short notes on the following: **20**
    a)   Instrumentation landing system
    b)   Modes in Gunn Diode
    c)   'M' type microwave tubes.
    d)   Biomedical applications of microwave.