Roll No..... Total No. of page(s): 2

BT-8/D-21: 48140
ECE- 404N:Microwave Engineering

Time: 3 hrs] **[Max. Marks: 75**

Note: Attempt five questions in all by selecting at least one question from each unit.

UNIT-I

Q.1 (a) Explain Double Bridge method for power measurements? **8.**

(b) Derive the expressions for calculation of unloaded Q-factor of rectangular cavity resonator? **7.**

Q.2 Explain the followings:

(i) Down Conversion Method of Frequency Measurements?

(ii) Impedance Measurements? **7+8=15.**

UNIT-II

Q.3 (a) A 400 kW cylindrical magnetron operating at X-band has following set of parameters: Anode voltage (V_{dc}) = 32kV, beam current (I_{dc}) = 84 A, radius of cathode cylinder (r_c) = 6cm, radius of anode cylinder (r_a) = 12cm, magnetic flux density (B) = 0.01 Wb/m^2. Calculate (i) Cyclotron angular frequency (ii) the cut off magnetic flux density for a fixed V_{dc} (iii) the cut –off voltage for a fixed B_0 (iv) efficiency? **4×2=8.**

(b) Explain the working of Reflex Klystron and derive expressions for Bunching Process? **7.**

Q. 4 (a) Explain the amplification process in Helix TWT? **7.**

(b) Why conventional vacuum tubes cannot be used at microwave frequencies above 1GHz? 8

UNIT-III

Q. 5	(a) Explain the working of precision variable attenuator and its S-Matrix in detail?	7.
	(b) The S-parameters of a two port network are $S_{11} = 0.26\text{-}j0.16$, $S_{12} = S_{21} = 0.42$ and $S_{22} = 0.36 - j\ 0.57$. Calculate insertion loss, transmission loss, reflection loss and return loss?	4×2=8.
Q. 6	(a) Explain the working of directional coupler and derive its S-Matrix?	8.
	(b) Explain the working of a Magic Tee and derive its S-matrix?	7.

UNIT-IV

Q. 7	(a) An IMPATT diode operates with carrier drift velocity (v_s) of 1.5×10^7 cm/s, length of drift region (L) is 8μm, maximum operating current (I_{max}) equals to 180 mA , maximum operating voltage (V_{max}) = 90 Volts and efficiency is 10%. Calculate (a) the maximum CW output power in watts and (b) the frequency of output power in GHz?	8.
	(b) Explain the negative differential resistance phenomenon in GUNN diode?	7.
Q. 8	(a) Explain the working of Parametric Amplifiers?	8.
	(b) Compare TRAPATT and BARITT diodes in context to their principle of operation, properties and applications?	7.

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