GANPAT UNIVERSITY

B. TECH. SEMESTER VII ELECTRONICS & COMMUNICATION ENGINEERING

CBCS REGULAR EXAMINATION, NOV- DEC 2015

2EC705 (B): MICROWAVE ENGINEERING

Time: 3 Hours. **Total Marks: 70**

Instructions:

1. Attempt **all** questions.
2. Answers to the two sections must be written in **separate** answer books.
3. Figures to the right indicate full marks. **Assume suitable data, if necessary.**

SECTION-I

Q.1 (A) Describe the advantages of the microwaves over low frequencies. Also list out limitations of use of microwave tubes at microwave frequency. **6**

(B) Match a load impedance of $Z_L = 100 + j80$ to a 50 Ω line using a single series open-circuit stub. Calculate distance and length parameters for the same stub using smith chart. **6**

OR

Q.1 (A) A 600 Ω lossless transmission line is fed by a 50 Ω generator. If the line is 200 meter long and terminated by load 500 Ω, Determine in dBs (1) Reflection Loss (2) Transmission Loss and (3) Return loss **6**

(B) Define the following terms and their physical significance with reference to a transmission line Characteristic impedance ,Phase velocity ,Phase constant, VSWR **6**

Q.2 (A) What do you mean by an ideal directional coupler? Explain Two-hole directional coupler and discuss coupling factor, isolation and directivity for the same. **6**

(B) Explain the use of magic Tee as duplexer and as a mixer for super heterodyne receiver. **5**

OR

Q.2 (A) A 50 mW power is feed into one of collinear port 1 of lossless H plane T junction. Calculate the power delivered through each port when other ports are terminated with match load. **6**

(B) Explain the operation of faraday rotation isolator with necessary diagrams. **5**

Q.3 (A) Why is a hybrid E- H phase Tee referred to as magic tee? Derive the scattering matrix for magic tee. **4**

(B) Explain measurement of impedance using slotted line. **4**

(C) Why Scattering parameters ("S") are used for analysis of microwave circuits? Also list out properties of S matrix. **4**

SECTION-II

Q.4 (A) What is Velocity modulation in klystron amplifier? Derive equation of maximum velocity and minimum velocity of electron in klystron amplifier. 6

(B) Describe tunneling phenomenon in Tunnel diode by energy band diagrams and I-V characteristics. 6

OR

Q.4 (A) *Describe about functioning of Reflex klystron amplifier* with suitable equations and diagrams. 6

(B) Only list out various methods for microwave power measurement.Discuss in detail about method for measurement of low microwave power. 6

Q.5 (A) What is slow wave structure? Explain how a helical TWT achieves amplification? What is the significance of an attenuator in the construction of TWT?

(B) Explain the operation of the Varactor diode. Discuss the constructional details, equivalent circuit and figure of merit with its applications. 6

OR

Q.5 (A) What are cross fields? How does a magnetron sustain its oscillations using this cross fields? Assume π- mode for explaining the same. 5

(B) Explain the basic operating principle of the parametric amplifiers. What are its advantages and applications? 6

OR

Q.6 (A) Explain Gunn effect using two valley theory. 4

(B) Calculate the maximum range of a RADAR system which operates at 3 cm with a peak pulse power of 750 kW if its antenna is 5 m2, minimum detectable signal is 10-13 W and the RADAR cross section area of the target is 20 m2. 4

(C) What is RADAR? Discuss about Doppler effect in radar systems. 4

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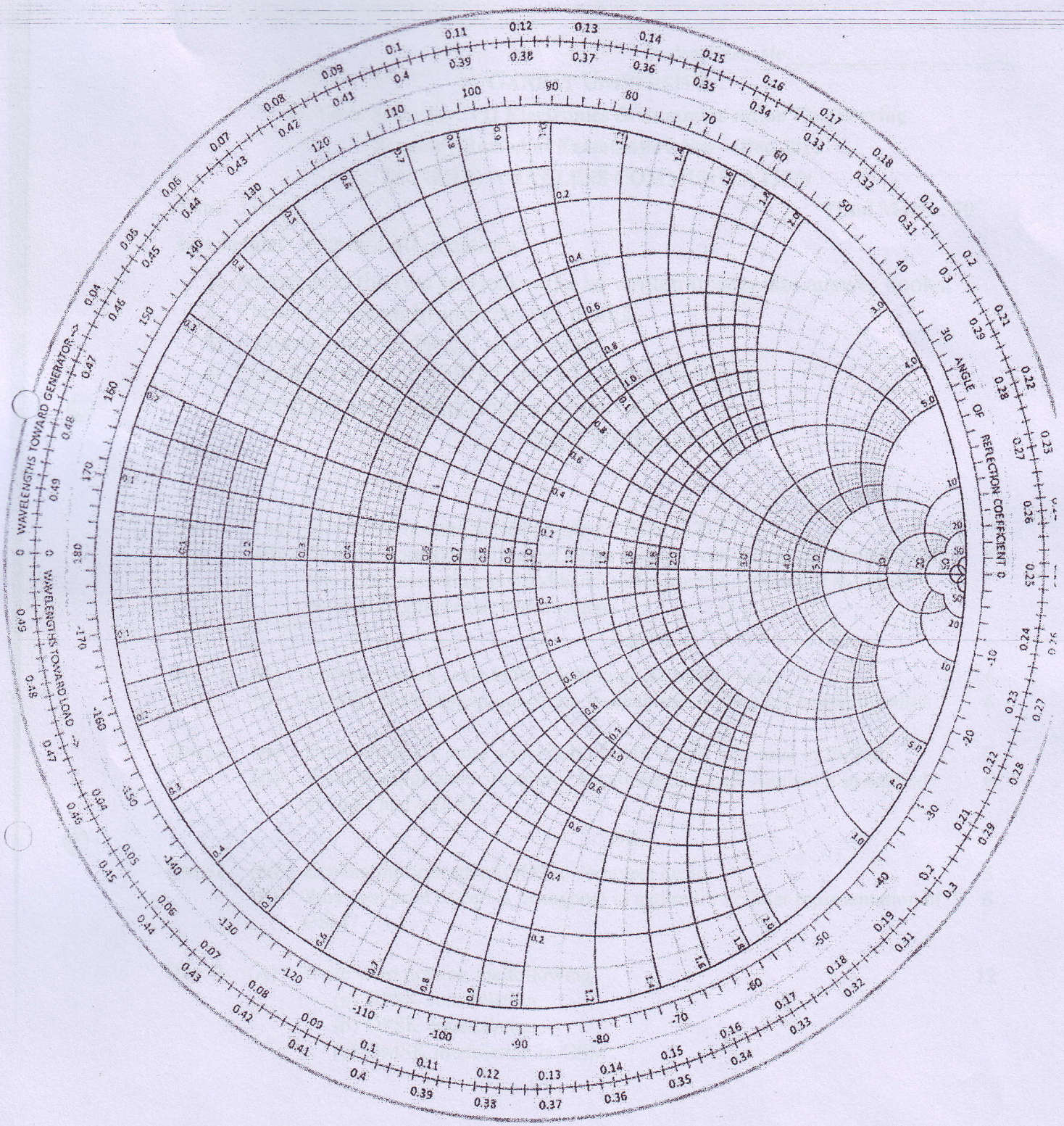
Smith Chart


WAVELENGTHS TOWARD GENERATOR
WAVELENGTHS TOWARD LOAD
ANGLE OF REFLECTION COEFFICIENT θ