

2056
B.E. (Electronics and Communication Engineering)
Sixth Semester
EC-601: Microwave and Radar Engineering

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

- Q.1a) Why are ordinary vacuum tubes unsuitable at microwave frequencies?
b) What is a matched load in a waveguide? Why is it important?
c) Calculate VSWR for a reflection coefficient of 0.33.
d) What is back heating in magnetron? How can it be avoided?
e) What are the limitations of CW radar? (5×2)

Section - A

- Q.2a) Why EH plane tee is called a magic tee. (3)
b) Why Faraday rotation is called a non-reciprocal phenomenon? (3)
Calculate the resonant frequency of a circular resonator of dimensions $a=3\text{cms}$, $b=2\text{cms}$ and $l=4\text{cms}$, when the mode of operation is TE_{101} .
Q.3a) Differentiate between fixed attenuator and variable attenuator. (6)
Derive the scattering matrix of a directional coupler.
b) Explain the principle of impedance measurement using slotted line method. (4)
Q.4a) What is Gunn effect? Differentiate between Gunn diode and IMPATT diode. (5)
b) Calculate the transit time of electrons in a Gunn diode having length $15\mu\text{m}$ and drift velocity $2\times 10^7\text{ cm/s}$. (5)

Section - B

- Q.5a) By mean of an Applegate diagram explain the operation of a reflex klystron. (5)
Show that the theoretical efficiency of reflex klystron is 22.78%.
b) A reflex klystron has beam voltage 400 V and beam current 25 mA. Calculate the input power. (5)
Q.6a) Explain pulsed radar with block diagram. Explain the factors affecting radar range. (5)
b) What are slow wave structures? Why is helix used in TWT? What are the limitations of helical TWT? (5)
Q.7a) What is clutter in radar systems? Explain the working principle of MTI radar. (5)
b) Write short notes on the following:-
(i) Cylindrical Magnetron
(ii) TRAPATT (5)
(iii) Pulse Doppler Radar

x-x-x