

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-2008**III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS
MICROWAVE ENGINEERING
(ELECTRONICS & COMMUNICATION ENGINEERING)**

AUG/SEP-2008

MARK-3 HOUR
MARK-80**ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.**

1. (a) Discuss the limitations of conventional tubes at microwave frequencies.
(b) Explain the principle of operation of two cavity Klystron with neat diagrams.
2. (a) A helix traveling wave tube is operated with a beam current of 300 mA, beam voltages of 5 KV and characteristic impedance of 20 Ohm. What length of the helix will be selected to give a output power gain of 50 dB at 10 GHz.
(b) Explain how the amplification takes place in TWT. Compare its bandwidth with Klystron amplifier..
3. (a) Derive an expression for the Hull cut off condition for cylindrical magnetron oscillator.
(b) Write short notes on "8 cavity magnetron"
4. (a) Describe a non-degenerate negative resistance parametric amplifier.
(b) An N type Ga As GUNN diode has the following specification
Threshold field: 3KV/m
Applied field 3.5KV/m
Device length 10 micrometers
Doping Constant 10^{14} electron/ Cm³
Operating freq. 10 GHz
Calculate the current density and (-Ve) electron mobility in the device, explaining the relations used.
5. (a) Find the dimensions of rectangular waveguide to be used to propagate the frequency of 8 GHz to 12 GHz for dominant mode operation.
(b) Derive an expression for Q of a cubic cavity supporting TE₁₀₁ mode.
6. (a) State the properties of E plane Tee and H plane Tee.
(b) Show that a symmetrical magic Tee is a 3dB directional coupler.
7. (a) Enumerate the properties of S parameters.
(b) Formulate the S parameter matrix of a 4 port circulator.
8. (a) Explain VSWR measurement procedure in microwave laboratory with a suitable microwave bench setup.
(b) Calculate VSWR of a rectangular guide of 2.3cm x 1.0 cm operating at 8 GHz. The distance between twice minimum power points is 0.09 cm. ?