Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B. Tech.**
PET6I102

6th Semester Regular Examination 2017-18
HIGH FREQUENCY ENGINEERING
BRANCH : ECE, ETC
Time : 3 Hours
Max Marks : 100
Q.CODE : C224

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type or dash fill up type :*** **(2 x 10)**

a) _____ is a single cavity klystron tube that operates as on oscillator by using a reflector electrode after the cavity.
a) Backward wave oscillator
b) Reflex klystron
c) Travelling wave tube
d) Magnetrons

b) _____ is a microwave device in which the frequency of operation is determined by the biasing field strength.
a) VTM
b) Gyratron
c) HelixBWO
d) None of the above

c) A multiple-terminal solid-state device similar to a transistor that generates frequencies up to about 10000 MHz by injecting electrons or holes into a space-charge layer which rapidly forces these carriers to a collecting electrode.
a) IMPATT
b) Klystron
c) Spacistor
d) Magnetron

d) The matrix of an ideal isolator is not _____
a) Unitary
b) Symmetric
c) Lossless
d) None of the above

e) The free electron concentration in N-type GaAs is controlled by:
a) Effective doping
b) Bias voltage
c) Drive current
d) None of the above

f) To prevent an IMPATT diode from burning, a constant bias source is used to maintain _____ at safe limit.
a) Average current
b) Average voltage
c) Average bias voltage
d) Average resistance

g) In order to achieve high current density, a compromise in _____is made in a TRAPATT diode.
a) Gain
b) Size
c) Operating frequency
d) No compromise is made on any of the parameter

h) A _____ determines the target range by measuring the round trip time of a pulsed microwave signal.
   a) Pulse radar
   b) Doppler radar
   c) Cross section radar
   d) None of the above

i) In a Gunn diode oscillator, the electron drift velocity was found to be 107 cm/second and the effective length is 20 microns, then the intrinsic frequency is:
   a) 5 GHz
   b) 6 GHz
   c) 4 GHz
   d) 2 GHz

j) The term radar cross section defines the:
   a) Scattering ability of the target
   b) Power radiating ability of the radar
   c) Amount of energy scattered by unwanted objects
   d) Cross section of radar area through which energy is emitted

Q2 **Answer the following questions: *Short answer type :*** **(2 x 10)**

a) State the differences between TWT and Klystron.
b) What are cross field devices?
c) What is meant by duty cycle?
d) What are the disadvantages of parametric amplifier?
e) Explain the action of a Rat-race junction.
f) Give the physical interpretation for phase and group velocity.
g) Define GUNN effect.
h) How can you extend the range of power measurement?
i) What is meant by avalanche transit time device?
j) How microwave measurements are different from low frequency measurement?

Part – B (Answer any four questions)

Q3 **a)** Explain the working principle of TRAPATT diode and derive the power output and efficiency. **(10)**
b) With relevant equations, explain about helix travelling tube. **(5)**

Q4 **a)** Explain the working principle and modes of operation of microwave bipolar transistor. **(10)**
b) Explain briefly the term MASER (Microwave Amplification by Stimulated Emission of Radiation). **(5)**

Q5 **a)** From the first principle derive the s matrix parameters of directional coupler. **(10)**
b) Explain with diagrams waveguide corner, bends and twists. **(5)**

Q6 **a)** Explain the working principle and operation of microwave FET. **(10)**
b) What is an isolator? Write down s parameters. **(5)**

Q7 **a)** Explain various scanning techniques in detail with neat diagram. **(10)**
b) Explain briefly cavity resonator with neat diagram **(5)**

Q8 **a)** Discuss in detail the impedance measurement using microwave devices. **(10)**
b) Discuss in detail about TUNABLE MAGNETRON. **(5)**

Q9 **a)** Explain in detail the measurement of VSWR through return loss measurement. **(10)**
b) Explain the operation of MTI radar. **(5)**