HD-003-1204006

M. Sc. (Physics) (Sem. IV) (CBCS) Examination

April - 2023

ET-10 : Pulse & Microwave Electronics

Faculty Code : 003
Subject Code : 1204006

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Numbers in the right margin indicate marks.

1 Attempt any seven : **14**

(a) Draw the circuit of double diode series noise clipper.

(b) Calculate duty cycle of a rectangular waveform of frequency 10 kHz and pulse width 50 micro second.

(c) A $100\,\mu F$ capacitor is charged to 10 V. It starts discharging through $R = 100\,k\Omega$ resistance. What will be the voltage across it at t = 0.693 RC ?

(d) Define rise time of pulse waveform. Show that for a step voltage input applied to RC circuit, the rise time t_r of the output is 2.2 RC.

(e) Sketch the internal circuit diagram of timer IC-555.

(f) Define antenna.

(g) Write full form of RADAR. What are the basic functions of Radar ?

(h) List display methods used in Radar system.

(i) Give a list of linear beam microwave tubes.

(j) What do you mean by isotropic antenna and directional antenna ?

2 Attempt any **two** :

    (a)   Draw and explain the operation of circuits of positive and   7
negative biased clampers using diodes.

    (b)   Derive criteria for getting good differentiation and integration   7
of a periodic waveform by RC circuit. Design integrating
circuit for obtaining good integration of an input square
wave of frequency 100 kHz.

    (c)   Define rise time and fractional tilt for a pulse waveform   7
and derive expressions for relationship between rise time
and upper cutoff frequency and fraction tilt and lower cut-
off frequency of an amplifier.

3   (a)   Draw the circuit of monostable multivibrator using   7
transistors, explain its operation with necessary diagrams.

    (b)   Sketch the circuit of Schmitt trigger using transistors and   7
explain its working with input and output characteristics in
detail. Draw the transfer characteristic of Schmitt trigger
for LTP = 3 V and UTP = 5 V.

<p align="center">OR</p>

3   (a)   Derive Radar range equation. Discuss in detail the factors   7
influencing maximum range of radar. Why "ground hopping"
is emphasized for military air crafts ?

    (b)   Discuss any two display methods of radar, in detail. What   7
do you mean by blind speed.? An MTI radar operates at 10
GHz with pulse repetition frequency of 3000 pps. Calculate
its lowest blind speed.

4 Attempt any **two** :

    (a)   What are the different types of antennas ? Discuss any   7
three types of antenna in detail.

    (b)   Discuss with neat diagrams construction and working of   7
two cavity klystron.

    (c)   Discuss in detail how radiation pattern of antenna is   7
generated ? What do you mean by "null zone" ?

5 Attempt any **two** :   14

   (a) Discuss with circuit diagram's transistorized RC Ramp waveform generator in detail.

   (b) Sketch the circuit of astable multivibrator using IC-555 and explain its operation.

   (c) Write a detailed note with appropriate sketches on Yagi-Uda antenna. List its applications. Why is it called "super gain" antenna ?

   (d) Draw a functional block diagram of a pulsed radar system and describe the function of each block.

———————