2007

ELECTRONICS

PAPER-II

Full Marks : 75

Time : 3 hours

The figures in. the right-hand margin indicate full marks.

Candidates** are required to* give *their answers in their **own words as *far* as *practicable.*

*rite the **answers questions** of each Group in separate* books.

swer Q. *No. 1* and *any three* from the rest in each group.

Group - A

(Marks : 40)

(a) . Define V.S.W.R, Give the relation :between `'V.S:W.R and reflection coefficient: 2

(b) What do you mean by Phase constant of a transmission line? 2

(c) Define the directivity of an antenna. 2

(d) What do you mean by Skip distance ? 2

(e) What do you mean by cut-off wave length in a **rectangular** wave guide. 2

(a) Derive the general solutions for the line voltage and line current in terms of the distance variable d in the sinusoidal steady state.

(b) Discuss the reasons for transmission-line matching and the principle behind matching. (3+3)+(2+2)

3. (a) When is it meaningful to attribute a group velocity to a signal comprised of more than two frequencies ? Why?

(b) Briefly outline the procedure for deriving the expressions for TM mode fields in a rectangular waveguide.

(c) Why is the dimension b of a rectangular waveguide generally chosen to be less than or equal to one-half the dimension a ? **(1+2)+5+2**

4. (a) To what does the word `retarded' in the terminology `retarded magnetic vector potential' refer? Explain.

(b) Why microwave, region is called a transition region ? Deduce an expression for field distribution across the aperture ' of a parabolic reflector . **(1+2)+(2+5)**

5. (a) Explain the phenomenon of selective fading in communication through tropospheric, waves. What. is duct propagation ?

(b) Show that the phase velocity , of a- plane electro-magnetic wave propagating in an ionized medium is greater than the velocity of light in free space.

(c) Obtain the relationship between the maximum radio frequency reflected from an ionospheric layer to the corresponding critical frequency. **(2+2)+3+3**

6. Write short notes (any *two)* **5x2**

(a) Characteristics of Plasma.

(b) MUF.

(c) Resonant and non-resonant antenna.

(d) Excitation of modes in waveguides.

Group - B

(Marks 35)

1. (a) State Superposition theorem.
   (b) Distinguish between active and passive filters.
   (c) Draw the circuit diagram of a band stop filter.
   (d) What do you mean by image impedance of a network.
   (e) Draw two different kinds of waveform possessing. odd symmetry. 1X5

2. (a) For the network as shown in Fig Q. 2(a), find the current T using superposition theorem. 5

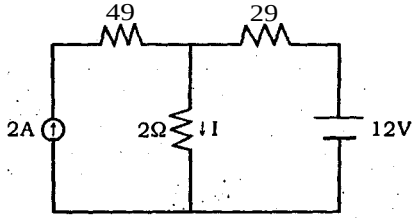

Fig Q. - 2(a)

(b) For the a. **c. circuit as shown in** Fig Q. 2(b), find I, **Ix and** Ic in phasor form.

Given : v(t) = 220J sin 314t 5

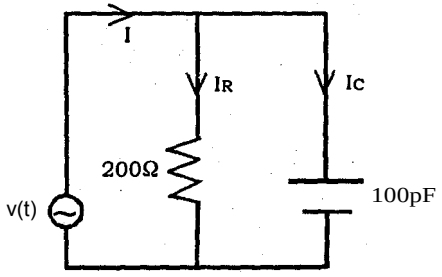

Fig Q. 2(b)

3. (a) Draw Pole-zero diagram of the system function

$$Z(s) = \frac{s(s+3)}{(s+1)(s^2+4s+13)}$$ 5

(b) Following data were obtained experimentally for an unknown two-port network. Compute the Z-parameters. 5

	V1	V2	I1	I2
Output open	100V	60V	1OA	0
Input open	30V	40V	0	3A

4. (a) A system has a system function given by

$$H(s) = \frac{X(s)}{(s+1)(+3)}$$ Given x(t) cost.

Determine y(t) using Laplace Transform. 5

(b) (i) Obtain the expression for gain of a Band-pass R-C filter. 5'

(ii) A band-pass filter **consists** of two R-C networks connected in cascade. The'low-pass filter consists of resistance R1. lOKQ and .capacitor C = 100µF and high-**pass M**iter . **carisists**. of k2 I MS2 and. C2= 0.01 uF.

Find the lower and upper cut-off frequencies and the band pass gain.`

5. (a) Discuss the Foster methods of Network synthesis. 5

(b) The driving point impedance of an LC network is given by

$$Z(s) = \frac{10(s^2+4)(s^2+16)}{s(s^2+9)}$$

Obtain the Foster 1st form of network. 5

6. Write short notes on (any' *two)* 2x5

(a) Bode diagram.
(b) Characteristics impedance of a network.
(c) Hybrid parameters of a network.
(d) Jr to T transformation of network.