M.Sc.

2011

2nd Semester Examination

PHYSICS

PAPER—PH-204

Full Marks : 40

Time : 2 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.

*Illustrate the answers wherever necessary.*

Group—A

(Marks : 20)

Attempt *Q. No. 1* and any *one* from the rest.

1. Attempt any *five* bits :   2×5

   (a) Draw the circuit diagram of a constant–k band pass fitter and write down the expressions for its two cut-off frequencies.

(b) What is voltage standing wave ratio of a transmission line? Write its expression.

(c) How does a band stop filter developed with a high pass and a low pass filters?

(d) Explain the advantages of a photo-transistor over photo diode.

(e) Why TEM mode of propagation is not possible in a single conductor wave guide.

(f) Find the cut-off frequency of the following circuit and write the nature of the filter :

(Continued
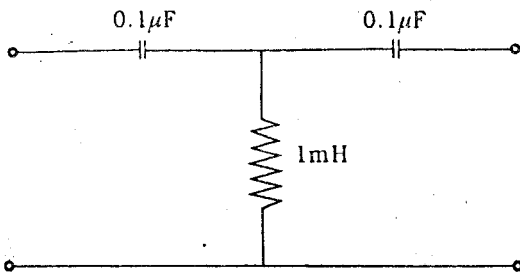
(g) Define attenuation constant and phase constant of a transmission line.

(h) Convert the following Π-network into its equivalent T–form.
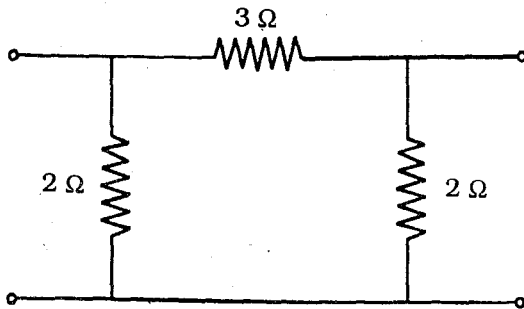
2. (a) State and explain the two corollaries of Foster's reactance theorem. 5

(b) A circuit has a pole at $w_1 = 10^6$ rad/sec and a zero at $w_2 = 1\cdot5 \times 10^6$ rad/sec. The input impedance is j. 1000 ohms at $0\cdot8 \times 10^6$ rad/sec. Design a series type Foster network that is equivalent to the original network. 5

3. Obtain the equation of guided wave through a rectangular wave guide. Hence obtain the expression of cut-off wave length.

Find also the expressions of group velocity and phase velocity of the waves through the wave guide.

Show that the product of group and phase velocities is always constant.

$$2\frac{1}{2}+1\frac{1}{2}+2\frac{1}{2}+1\frac{1}{2}+2$$

Group—B

(*Marks : 20*)

Attempt *Q. No. 1* and any *one* from the rest.

1. Attempt any *five* : 2×5

   (a) What is overflow? With an example discuss the overflow problem in case of sign bit addition.

   (b) Why does MOS technology used in LSI but the bipolar technology is used in SSI or MSI? Which one of the above two is faster?

(*Continued*)

(c) How many instructions a 8085 μp can take ? Explain it.

(d) Write the different jump instructions in 8085 μp.

(e) What is floating-point number representation ? Give an example.

(f) What is quantization error in pulse code modulation ?

(g) Write the difference of accumulator with other type of registers. Can you make the accumulator a pair with other register ?

(h) Give an example — how multiplication of two fixed point binary number in signed magnitude representation is done ?

2. (a) What do you mean by (8K×8) memory cell ? How to expand it into (8K×16) cell ?

   (b) Explain the role of memory deioder.

   (c) What is Mask ROM and PROM ?

   (d) Give the basic structure of A.L.U.   3+2+2+3

3. (a) What is pulse-amplitude modulation (PAM)? What is the advantage of PAM?   1+2

   (b) Add (+25) to (–30) in 2's compliment method.   2

   (c) What do you mean by XRA B, and XCHG, & DCR H in 8085 µp?   2

   (d) Write a short note on program counter and stack pointer.   3

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