2018

M.Sc. 2nd Semester Examination

PHYSICS

PAPER—PHS-203

Subject Code—33

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

Use separate Answer-scripts for Group-A & Group-B

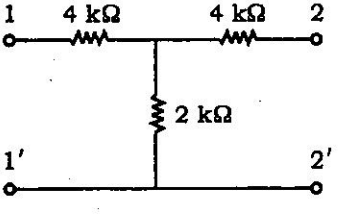
Group—A

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

1. Answer any *five* questions : 2×5

(a) Define reflection co-efficient and voltage standing wave ratio of a transmission line.

(b) Find the iterative impedance of the following T-network :



(c) Explain the origin of phase distortion in a transmission line.

(d) In which mode, a photo diode is biased (Forward or reverse) ? Why ?

(e) Define the primary line constants of a transmission line.

(f) Is it possible to fabricate an SCR using Germanium ? Why ?

(g) Suppose you want to design an automatic ON/OFF circuit for street lights. Which device will you prefer — a photo diode or a photo transistor ? Why ?

2. (a) Draw the circuit diagram of a constant-k band stop filter with reactive components. Derive the expressions for its cut-off frequencies and show that the resonant frequency of any arm (w_o) is equal to the geometric mean of its two cut-off frequencies (w_L & w_H). 1+4

(b) Find the expressions for α, β and characteristic impedance Z_0 of this filter in the pass band and in the attenuation band. Also show graphically their variations with frequency. 5

3. (a) What is a thyristor ? Draw the cross-sectional diagram of a Triac and show its circuit symbol. $1+\left(\frac{1}{2}+\frac{1}{2}\right)$

(b) Draw the I-V characteristics of a Triac with different gate current in both 1st and 3rd quadrant. 1

(c) Explain the use of a Triac as a light dimmer with necessary circuit diagram and waveforms of different voltages and currents. 3

(d) Explain the two corrollaries of Foster's reactance theorem. 4

Group—B

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

1. Answer any *five* bits : 5×2

(a) What do you mean by 32k × 16 memory cell ?

(b) Give the circuit of two bit binary multiplier.

(c) Draw the integrated circuit for 4 bit binary addition and subtraction.

(d) What is aliasing effect in digital communication ?

(e) What is meant by following instruction ?

(i) XRA B

(ii) DCR C

(iii) MVI C 05

(iv) HLT.

(f) What are the main features of 8085 μp ?

(g) Design a circuit using 8 : 1 MUX IC to get an waveform 10011010.

2. (a) What is A.L.U. ? What are the different actions that can be done in A.L.U. ?

(b) Give the schematic of a DAC circuit. Explain briefly.

(c) What are the different register available in 8085 microprocessor ? What is the function of ALE ?

3+3+4

3. (a) What is 'Nyquist rate' in digital communication ?

(b) What is the difference between S.A.M & R.A.M ? Give example of optical memory, magnetic memory and semiconductor memory.

(c) What is dc-multiplexer ? Design 1 : 4 dc-mux circuit with descrete component. 3+3+4

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