PG/IIS/PHS-204/15

M.Sc. 2nd Semester Examination, 2015

PHYSICS

PAPER— PHS-204(A & B)

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

PHS-204(A)

[*Marks* : 20]

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

1. Attempt any *five* of the following : 2×5

   (*a*) Draw the circuit diagram of an AC light dimmer using Triac and Diac.

   (*b*) Explain the advantages of a phototransistor over photodiode as a light sensor.

(*c*) Draw the circuit diagram of a constant-*k* band -stop filter and state the condition for which it will act as a constant-*k* band-stop filter.

(*d*) Define iterative impedance of a network and find out its expression for a *T*-network.

(*e*) A network is connected with a source having the internal impedance $R + jWR_i$, and a load Z_L in series. For which Z_L the load will be driven by the maximum power from the source. Justify your answer.

(*f*) When can you call two networks equivalent ?

(*g*) When can you call a transmission line loss-less and why ?

(*h*) What is quantum efficiency of a photo-diode ?

2. (*a*) Design a shunt type foster network equivalent to a circuit having a pole at $w_1 = 1$ megaradians/sec and a zero at $w_2 = 1{\cdot}5$

(*Continued*)

megaradians/sec. The input impedance of the circuit is j 1000 ohms at 0·8 megaradians/sec. 5

(*b*) Explain how a given Π network can be converted into its equivalent T form with necessary derivations. 5

3. (*a*) Derive telegrapher's equations and solve it to derive the general expression for voltage and current at any point along the length of a transmission line. 6

(*b*) Derive the condition for developing a distortion less line. 4

PHS-204(B)

[*Marks* : 20]

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

1. Answer any *five* questions : 2 × 5

(*a*) Show that MUX is an universal gate.

(*b*) What are the differences between RAM/ROM and storage memory ?

(*c*) What will be the content of the accumulator of 8085 microprocessor after the execution of following instructions :

	Hex Code
MVI B	06
HALT	76
MOV A, B	78

(*d*) What is aliasing effect in sampling process ? How it can be overcome ?

(*e*) What is tri state Buffer ?

(*f*) Represent the following Boolean function using a 8 : 1 MUX

$$F(0, 3, 5, 8, 9, 11, 12, 14)$$

(*g*) What are the advantages of digital communication over analog communication ?

(*h*) What is S/H circuit ? How sampling is done using the circuit ?

2. (*a*) Explain steps and timing of data flow using timing diagram when instruction code (MOV C, A - 4 F_H) stored in a location 2005_H, is fetched in case of 8085 microprocessor.

   (*b*) How data bus and address bus are demultiplexed ? 6 + 4

3. (*a*) With the help of circuit diagram explain how analog voltage is converted to digital voltage in a dual slope A/D converter.

   (*b*) What is quantisation process and the associated error ?

   (*c*) Define resolution and settling time in connection with D/A converter. 5 + 3 + 2