

M.Sc. 2nd Semester Examination, 2013

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

GROUP — A

[Marks : 20]

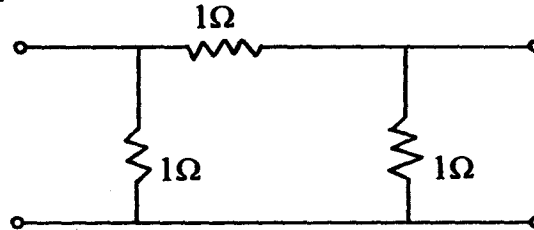
Answer **Q.No.1** and **one** from the rest

1. Attempt any *five* of the following : 2 × 5
 - (a) Define iterative impedance of a network and write down its expression for a *T*-network.

(Turn Over)

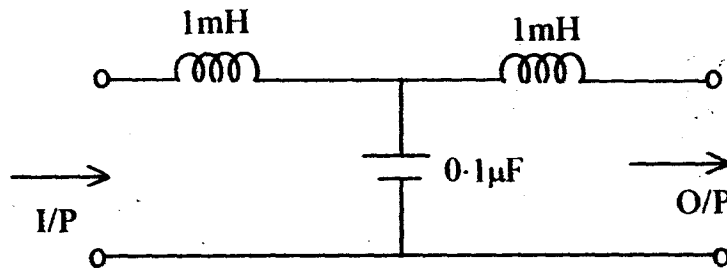
(b) State the two conollaries of Foster's reactance theorem.

(c) Convert the following π -network into its equivalent T -network.



(d) Which device is more sensitive – a photodiode or a phototransistor? Explain why?

(e) Find the cut-off frequency of the following network and write the nature of the filter.



- (f) Write down the names of different primary line constants of a transmission line.
- (g) State whether an intrinsic or extrinsic semiconductor is suitable for the fabrication of a thermistor and explain why ?
- (h) Explain the main limitations of twisted pair wire for carrying the high frequency signals.
2. (a) Sketch the frequency response characteristics of an ideal LPF. Explain how one obtain band pass and band reject filters using one LPF and one HPF.
- (b) Obtain an expression for the input impedance of a transmission line of length l , terminated by an impedance Z_R , in terms of secondary line constants.
- (c) Show that under certain conditions a lossless line can behave as a parallel resonant circuit.

3 + 5 + 2

3. What is an waveguide ? Derive the expressions for the field components for TE mode of e.m. wave propagation in a cylindrical waveguide. Show that an waveguide cannot be used at low radio wave frequencies. 1 + 8 + 1

GROUP – B

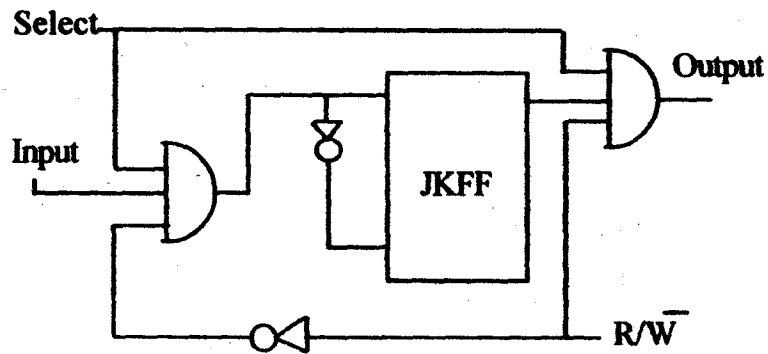
[Marks : 20]

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

1. Attempt any *five* bits : 2 × 5
- (a) Give the result of addition of $+q$ and $-q$ by 2's compliment method.
 - (b) What do you mean by overflow in binary mathematics ?
 - (c) What are the differences between PROM and RAM ?
 - (d) Write the programme in 8085 micro-processor for the following problem. 'Take a data in a register A and another one at B register. Then add them'.

(e) In a DAC for input signal 1100, the output voltage is 4V. What is the output voltage for input signal 1001 ? What is the resolution of this converter ?

(f) Explain the operation of the following circuit.



(g) What is the role of operating system in a computer ? Give an example of any operating system.

(h) Write the principle of data recording in a magnetic memory.

2. (a) What do you mean by DRAM?
- (b) How one can cascade to prepare (32×8) RAM cell from (8×8) RAM cell ?
- (c) State the working principle of any one ADC system with proper block diagram.
- (d) With proper circuit diagram discuss the operation of a parallel binary adder for addition of two four bit binary data. $1 + 2 + 3 + 4$
3. (a) What is sampling theorem ? What do you mean by aliasing effect ?
- (b) Why digital communication is advantageous over analog communication ?
- (c) What is the role of Accumulator (A) and program counter (PC) in 8085 μ P ?
- (d) What are the different flag registers in 8085 ? State different Jump instructions originating from those register in 8085.
 $3 + 2 + 2 + 3$
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