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End Semester Examination of Semester-II, 2016

Subject : PHYSICS (PG)

Paper : PHSPG-204 (Theory)

Group : A & B

Full Marks : 40

Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers whenever necessary

Use separate Answer scripts for Group A and Group B

Group A : Full Marks 20

PHSPG 204(A) : Electronics (Analog-II)

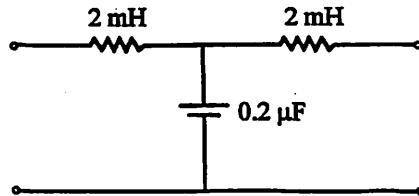
Answer Q1 and any one out of Q2 and Q3

Q1. Answer any five questions : 2x5=10

- i) Define the characteristic impedance for a two-port network.
- ii) Define the terms 'bel' and 'neper' for a symmetrical network.
- iii) The transmission parameters of a network (two port) are given below:
 $A = 4$, $B = 75 \Omega$, $C = 0.2\Omega^{-1}$ and $D = 4$. This two port network is a symmetrical one. Is this true or not?

(2)

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



- v) Define attenuation constant and phase constant of a transmission line and write their values in terms of primary line constants.
- vi) Show that under certain conditions a lossless line can behave as a parallel resonant circuit.
- vii) Define slew rate & CURR of an OPAMP.
- viii) Suppose your transmission in open ended. What is the value of reflection co-efficient? What is the physical significance of it?
- Q2. a) What are the advantages of active filters over passive filters? 2
- b) Design a 1st order active band pass filter having cut-off frequencies of $f_L = 1$ KHz and $f_H = 20$ KHz using OP-AMP as active element and derive the necessary theory. 5
- c) Explain how an IC voltage regulator 7805 can be converted into a constant current regulator with necessary circuit diagram. 2

d) Draw the equivalent circuit of a Practical OP-AMP.

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Q3. a) For a low-frequency transmission-lines, considering the proper approximates of transmission line parameter, calculate the attenuation constant and the phase constant of the line (per unit length). Calculate the phase velocity in this case. Is this line is free from phase distortion? 3+1+1

b) What is voltage standing wave ratio (VSWR) in case of a transmission line?

A loss-less line of 100Ω characteristics impedance connects a 100 KHz generator to a 140Ω load. The load power is 100 mW. Calculate the voltage reflection co-efficient and VSWR. 1+2

c) Define the propagation constant for unsymmetrical two-port network. 2

Group B : Full Marks 20

PHSPG 204(B) : Electronics Digital-II

Answer Q1 and any one out of Q2 and Q3

Q1. Answer any five questions : 2x5=10

i) Draw the logic Circuit diagram of a Full-adder using Half-adders and explain its operation.

ii) Construct a full-subtractor using all NAND gates.

- iii) What is EPROM and E²PROM?
- iv) What do you mean by static and dynamic memories?
- v) What do you mean by memory mapped I/O?
- vi) Discuss the function of ALE signal of a microprocessor.
- vii) Realize a delay Flip-flop using JK/FF.
- viii) Explain the function of program counter & stack pointer of a μ processor.

Q2. a) Draw the block diagram of a IC-555 and explain its operation as an astable multivibrator. 6

b) What do you mean by duty-cycle of an astable multivibrator? Discuss how duty-cycle of any value can be obtained. 1+3

Q3. a) Draw the functional block diagram of a 8085 microprocessor and discuss the function of each block. 7

b) What are the different instructions used in 8085 microprocessor? Give example of each category. 3

