2019

M.Sc.

2nd Semester Examination

PHYSICS

PAPER – PHS-203 (Gr. – 203.1 & 203.2)

Full Marks : 50

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.
Use separate answer scripts for Group 203.1 and Group 203.2.

(*Analog Electronics-II – PHS 203.1*)
Answer Q1, Q2 and any one from Q3 and Q4.

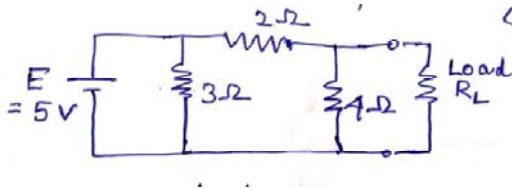
1. Answer any two bits: **2 X 2 = 4**

(i) Write down the properties of poles and zeros of reactance function.

(ii) Design a low pass filter having cut-off frequency 1 kHz and nominal resistance 600Ω.

(iii) If Z_1 and Z_2 are the series impedance and shunt admittance per unit length of a transmission line, then write the expressions of the characteristic impedance and propagation constant in terms of Z_1 and Z_2.

(iv) Find the Thevenin's equivalent network of the following circuit:



(Turn Over)

2. Answer any two bits: **2 X 4 = 8**

(i) What do you mean by image impedance and find out its expression.

(ii) Consider the 3m long lossless air filled Transmission line. It has a characteristic impedance of 120Π is terminated by short circuit and excited with a frequency of 37.5 MHz. What is the nature of input impedance?

(iii) What is phototransistor? What are its applications over photo-diode?

(iv) Prove the following relation for symmetrical *T* network having series impedance Z_1 and shunt impedance Z_2; γ being the propagation constant $\cos h\gamma = 1 + \frac{Z_1}{2Z_2}$.

3. (i) A half wave rectifier circuit employing an SCR is adjusted so that the gate current becomes 1 mA. The forward breakdown voltage of the SCR is 100 V for I_G = 1 mA. Assume that the load resistance is 100Ω and the holding current to be zero. Calculate the firing angle, conduction angle and average current when a sinusoidal voltage of 200V peak is applied. (4)

(ii) (a) What type of semiconductor is not used in thyristor and why? (2)

(b) What are the differences between Diac and Triac? (2)

4. Develop the differential equations for voltage and current of the transmission line and solve it. Hence prove the statement that a line of finite length terminated in a load equivalent to its characteristic impedance, appears to the sending end generator as an infinite line. (5+3)

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(*Digital Electronics-II – PHS 203.2*)

Answer Q1, Q2 and any one from Q3 and Q4.

1. Answer any two bits: **2 X 2 = 4**

(i) Represent +7 in signed binary number and in one's complement form.

(ii) What is the bit storage capacity of a ROM with 512X4 organizations?

(iii) Draw schematically the expansion of 4:1 MUX to 8:1 Mux.

(iv) What are the functions of the following instructions in 8085 microprocessor: LXI H, 0010H, MOV M,A.

2. Answer any two bits: **2 X 4 = 8**

(i) Discuss the operation of a digital comparator.

(ii) What do you mean by ALU and accumulator?

(iii) Give a schematic block diagram of an ADC and explain briefly.

(iv) What is EEPROM? How is it different from RAM?

3. (i) Write an assembly language program for 8085 microprocessor to perform the following task: Store two hexa decimal numbers (32H and 97H) in the register B and C respectively. Then subtract the content of C from that of B and store the result in the memory location E050. (4)

(ii) A four-bit D/A converter produces an output of 4.5 V for an input code 1001. Find the output for an input code 0011. (4)

4. (i) Discuss the operation of diode matrix ROM with necessary diagram. (4)

(ii) How does a static RAM cells differ from a dynamic RAM cell? (2)

(iii) How data are written in PROM? (2)

(Internal Assessment – 10)