Total page: 02
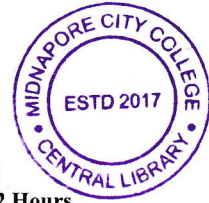
PG CBCS
M.Sc. Semester-II Examination, 2022
PHYSICS
PAPER: PHS203
(ANALOG ELECTRONICS & DIGITAL ELECTRONICS)

Full Marks: 40   **Time: 2 Hours**

Write the answer for each unit in separate sheet

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.

PHS 203.1 Analog Electronics

Marks: 20

GROUP-A

1. Answer any <u>one</u> question: 2×2=4

a) A T-section of a low pass filter has series inductance of 100 mH and shunt capacitance of 0.025 μF. Find the cut-off frequency and nominal design impedance (R_0).

b) Draw the volt-ampere characteristics of a silicon control rectifier (SCR) as a function of gate current.

c) What do you mean by a photo transducer? What are the basic requirements of a transducer?

d) A coaxial cable has a 75 Ω characteristic impedance and a nominal capacitance of 69pF/m. What is its inductance per meter? If the diameter of the inner conductor is 0.584 mm, and the dielectric constant of the insulation is 2.23, what is the outer conductor diameter?
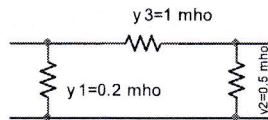
GROUP-B

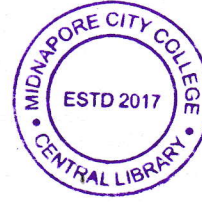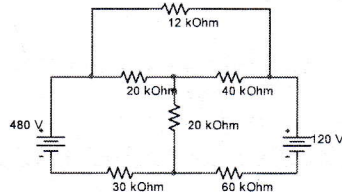**2. Answer any <u>two</u> questions:**   2×4=8

a) Find the Z parameters of the given circuit below
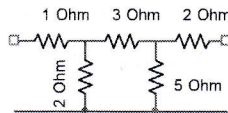
b) A transmission line is required to transmit power of 50μwatt and receive power 100μwatt at the receiving end by using repeater station having gain of 60 dB. If the line attenuation is 0.1 neper per km, determine maximum permissible length of the line.

c) Find the equivalent T-network for the л-network given below.

d) Using Thevenin theorem, determine the current through 12 KΩ resistor for network given below

GROUP-C

3. Answer any two questions: **1×8=8**

(a) What do you mean by distortion less line? Derive the condition for zero frequency distortion and zero phase delay distortion. Also find the characteristic impedance under the condition of distortion less transmission.   2+4+2

b) (i) The Z-parameters of two-port network are given by $Z_{11}=30\Omega$, $Z_{22}=10\Omega$, $Z_{12}=Z_{21}=15\ \Omega$. Calculate the transmission parameters for the network.

(ii) The following equations give the currents at two ports of a 2-port network:

$$I_1=0.2V_1-0.05V_2$$
$$I_2=-0.05V_1+0.1V_2$$

Determine the Y parameters.   4+4

PHS 201.2 Digital Electronics
Marks: 20

GROUP-A

1. Answer any two questions: **2×2=4**

a) What is the floating-point representation of a binary number?

b) Why does DRAM need periodic refresh during its operation?

c) What is the difference between a microcontroller and microprocessor?

d) State Nyquist theorem of sampling.

GROUP-B

2. Answer any two questions: **2×4=8**

a) Implement the Boolean expression $F(A, B, C) = \sum m(0,2,5,6)$ using a 4:1 multiplexer.

b) Do the addition of an 8-bit binary equivalent of two decimal numbers 45 and -58.

c) Draw a unit cell of a DRAM chip and explain its write and read operations.

d) Draw the internal structure of an 8085 microprocessor and briefly explain its important operations.

GROUP-C

3. Answer any one questions: **1×8=8**

a) Why we need analog to digital and digital to analog conversion. Describe a digital to analog conversion (DAC) method using R-2R ladder and explain its operation in detail. (2+6)

b) What is ALU? What is the largest and smallest 8-bit unsigned and signed binary number respectively? Perform the signed multiplication of 4-bit binary equivalent of decimal number -7 and 6. (2+2+4)

*****