

2022

M.Sc.

2nd Semester Examination

PHYSICS

PAPER—PHS-203

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.*

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

*Illustrate the answers wherever necessary.*

**PHS-203.1 ANALOG ELECTRONICS - II**

[Marks : 20]

1. Answer any *two* questions : 2×2

- (a) Find the characteristic impedance of a  $\pi$  network with  $Z_A = 4$  ohms  $Z_B = 8$  ohms and  $Z_C = 4$  ohms.

*(Turn Over)*

- (b) Draw the IV characteristics of an SCR indicating its different characteristic voltages and currents.
- (c) Define reflection coefficient and voltage standing wave ratio in a transmission line.
- (d) Draw the circuit diagram of an AC light dimmer using triac and diac.

2. Answer any *two* questions :

2×4

- (a) Name the different types of distortions which arise in a practical transmission line and explain their origin. How these can be removed in a practical transmission line ?
- (b) What type of material is used for the fabrication of a thermistor and why ? Which device is more sensitive as a light sensor – a photo diode or a photo transistor ? Explain.
- (c) State and explain the two corollaries of Foster's reactance theorem.

- (d) Design a shunt type Foster network to give a driving point impedance of  $+j 200$  ohms at  $\omega = 1$  mega radians per second. There is to be a zero at  $\omega = 3$  mega radians per second and poles at  $\omega = 2$  and  $4$  mega radius per second.

3. Answer any *one* question : 1×8

- (a) (i) Draw the circuit diagram of a constant-k Band pass filter and derive the expression for its cut off frequencies. Derive the expression for attenuation constant and phase constant in the pass band and attention bands.

(ii) Why Germanium cannot be used to fabricate an SCR ? 7+1

- (b) (i) Draw the equivalent circuit of a practical transmission line and hence define the primary line constants.

(ii) Derive Telegraphers' equations and solve it to derive the general expression for voltage and current at any point along the length of the transmission line. 3+5

**PHS-203.2 DIGITAL ELECTRONICS - II**

[Marks : 20]

1. Answer any *two* questions : 2×2
- (a) Differentiate SAM and RAM with example.
- (b) What is mnemonics ? Give example of double byte mnemonics.
- (c) Find 15's and 16's compliment of C2.
- (d) In a 4-bit DAC the full swing is 0V to 30V. What will be the output voltage for input 1101 ? What is the resolution of the DAC ?
2. Answer any *two* questions : 2×4
- (a) (i) In a memory IC the first location and the last location is given by 000(H) and FF0(H). How many locations are there in the memory cell ?
- (ii) What do you mean by DRAM ? 2+2

(b) (i) What are the functions that can be executed by A.L.U ?

(ii) What do you mean by carry look ahead adder ? 2+2

(c) (i) Draw a circuit which can add or subtract 4-bit binary numbers.

(ii) Give the digital circuit of 2-bit multiplier. 2+2

(d) (i) Mention the name and importance of different FLAG registers in 8085 microprocessor.

(ii) What are the meaning of ORA C & INX D ? 2+2

3. Answer any *one* question : 1×8

(a) (i) What is EPROM ? Draw the circuit to expand 16×4 memory IC to 64×8 memory cell.

(ii) Explain the quantization process of pulse code modulation. 4+4

(b) (i) Explain the conversion process from analog voltage to binary bits with proper schematic diagram.

(ii) Explain the process of BCD to 7-segment display system. 4+4

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