C121

Total Pages : 3 Roll No. .....

PHY-504

Semiconductor Devices, Analog and Digital Electronics

M.Sc. PHYSICS (MSCPHY-16/17)

Ist Year Examination, 2022 (June)

Time : 2 Hours] **Max. Marks : 80**

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.

(2×20=40)

1. Describe the structure of a transistor? Draw the input and output characteristics of a transistor in common emitter configuration. Differentiate between FET and BJT.

2. What are rectifiers? Draw the circuit diagram of "Half wave rectifier" for corresponding waveforms and derive its power, efficiency and ripple factor.

3. Find voltage gain A_{if}, input resistance R_{if} and output resistance R_{of} using BJT for voltage-series feedback network. Discuss the effect of feedback on amplifier gain and band width.

4. Draw a neat diagram of RC coupled amplifier and explain its operation. Determine the frequency response of RC coupled amplifier at low and high frequencies with a neat diagram and write its advantages and disadvantages.

5. What are SISO and PIPO and write the differences between them? Explain the operation of Serial-In-Parallel-Out and Parallel-In-Serial-Out shift register.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. What are Multiplexers and Demultiplexer? Explain the working of a 4-to-l MUX and 2-to-4 binary decoder.

2. How does flash A/D converter operate? Explain.

3. What are the postulates of Boolean algebra? State and prove De-Morgan's laws. Also write the canonical form of F = A'C + BC'.

4. Draw the circuit diagrams of Half and Full adders and explain their truth tables.

5. Explain with neat circuit diagram the working of the square wave and triangular wave generation.

6. Draw the circuit diagram of an OP-AMP differentiator and explain its working.

7. Draw the equivalent circuit of an OP-AMP in the non-inverting configuration and derive an expression for its gain.

8. What is a P-N junction diode? Describe the working of P-N junction diode under forward and reverse biasing.