M. SC. (PHYSICS) (MSCPH)

Term-End Examination

June, 2025

MPH-005 : ELECTRONICS

Time : 2 Hours   *Maximum Marks : 50*

Note : *(i) Attempt any **five** questions.*

(ii) You can use calculator.

(iii) Symbols have their usual meanings.

1. (a) Explain the terms forward recovery time and reverse recovery time of a power diode. 5

    (b) Differentiate between LED and Laser diode. 5

2. (a) State the advantages of JFET over BJT.

5

(b) Draw and explain the action of CMOS inverter circuit with the help of truth table.   5

3. (a) Explain the construction and working of SCR. How does it differ from a Triac ?

4+1

(b) In a single ended input-single ended output configuration of differential amplifier, the input voltage is 10 mV. If the collector resistors $R_{C_1} = R_{C_2} = 47\,k\Omega$, emitter resister $R_E = 39\,k\Omega$ and supply voltage is $\pm 12\,V$, calculate the differential gain and output voltage of the circuit. Assume Si transistors.   5

4. (a) Describe the factors giving rise to output offset voltage of op-amp. Explain the method of measuring the output resistance of the op-amp.　　2+3

   (b) Design and draw the circuit of Schmitt trigger using an op-amp with hysteresis of 30% of $\pm V_{Sat}$.　　5

5. State the advantages of SMPS over linear power supply. Explain with the help of appropriate diagram the working of buck converter.　　3+7

6. (a) Explain the working of an astable multivibrator using an op-amp.　　5

   (b) Explain the basic operation of a PLL using schematic block diagram.　　5

7. (a) With the help of a block diagram, explain the working of successive approximation ADC.   7

   (b) Calculate the quantization noise of a digital signal with 20 mV step size.   3

8. (a) Draw the block diagram of the microcontroller 8051 architecture.   5

   (b) Describe the scheme used for multiplexing the address and data lines in microprocessor 8085.   5

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