

No. of Printed Pages : 5

**MPH-005**

**M. SC. (PHYSICS)**

**(MSCPH)**

**Term-End Examination**

**December, 2025**

**MPH-005 : ELECTRONICS**

*Time : 2 Hours*

*Maximum Marks : 50*

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

(ii) *You can use a calculator.*

(iii) *Symbols have their usual meanings.*

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1. (a) Explain the *four* important  $e^-$ -hole pair generation processes in semiconductors.

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- (b) What are the effects of temperature on the diode characteristics ?

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**B-1762/MPH-005**

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2. (a) What is Gunn diode ? Explain the origin of its negative resistance with the help of E-k diagram. 2+3
- (b) What are the methods of pumping used in laser diode to attain population inversion ? State the differences between Laser Diode and Light Emitting Diode (LED). 1+4
3. (a) State the advantages of Junction Field Effect Transistor (JFET) over Bipolar Junction Transistor (BJT). 4
- (b) Using frequency domain analysis, obtain the expression for the oscillator frequency and required amplifier gain of a phase shift oscillator. 6

4. (a) Prove that the high frequency response of transistor amplifier decreases by 6 dB/octave unit. 4
- (b) Draw the circuit of CMOS inverter and explain its working with the help of truth table. 3+3
5. (a) Draw the circuit of a basic differentiator using an op-amp. Obtain the expression for its output voltage. 2+3
- (b) (i) Describe the factors giving rise to output offset voltage of an op-amp. 2
- (ii) Explain the method of measuring the input resistance of an op-amp. 3

6. (a) Draw the circuit diagram of linear voltage regulator using a BJT as series pass element. State its advantages over shunt regulator using a Zener diode. 3+2
- (b) Draw the block diagram of PLL and explain its operation. 2+3
7. (a) What is monostable multivibrator ? Draw its circuit using an op-amp. and explain its working. 1+4
- (b) Output of a 5-bit DAC for binary input of 01001 is 3.6 V. Determine its step size and percentage resolution. 2+3
8. (a) Draw the block diagram showing basic components of a typical microcontroller and explain the function of each block. 5

(b) State the operations done by the following instruction of microprocessor 8085 : 5

(i) MVI B, 20H

(ii) JMP 3020

(iii) LDA 4000

(iv) LDAX B

(v) DCR C

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