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MPH-005

M. Sc. (PHYSICS)

(MSCPH)

Term-End Examination

June, 2024

MPH–005 : ELECTRONICS

Time : 2 Hours *Maximum Marks : 50*

Note : *Answer any* ***five*** *questions. You can use calculator. Symbols have their usual meanings.*

1. (a) Explain the structure and working of a power diode. What are the differences between the high power and low power diodes ? 3+2

   (b) How can the efficiency of a solar cell be increased ? How is the optimum band gap chosen for a solar cell material ? 3+2

2. (a) Describe the difference between the construction and operation of enhancement mode and depletion mode MOSFET. 5

   (b) Define intrinsic stand off ratio of a UJT. Draw the I-V diagram of a UJT and explain the origin of negative resistance region. 1+1+3

3. (a) Discuss the effect of various capacitors in an RC coupled common emitter amplifier on its frequency response. 5

   (b) Draw and explain the working of Hartley oscillator using an op-amp. Write the expression for its oscillation frequency. How can the frequency of this circuit be varied ? 3+1+1

4. (a) Draw the *four* possible negative feedback contigurations of an op-amp. Write the input and output impedances of these configurations in ideal cases. 5

(b) Explain the working of an op-amp based full wave precision rectifier with the help of appropriate circuit diagram. What are its advantages over a simple diode rectifier ? 5

5. Explain with the help of circuit diagram the working of shunt regulator using Zener diode. What are the limitations of this circuit due to the non-idealities of Zener ? What modifications in the circuit can be done to overcome the limitations ? 4+3+3

6. (a) Draw the schematic block diagram of PLL and explain its basic operation. 2+3

(b) Explain the working of an astable multivibrator using an op-amp. Under what condition can the capacitor voltage can be considered to be nearly triangular ? 4+1

7. (a) Output of a 4-bit DAC for digital input of 1011 is 5.5 V. Determine its step size and percentage resolution. 3+2

   (b) Describe any *five* hardware techniques used for improving the signal-to-noise ratio of an electronic system. 5

8. (a) Differentiate between microprocessor, microcontroller and microcomputer. 5

   (b) Describe the various registers present in the microprocessor 8085. 5