

**P-107**

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# **MSCPH-509**

## **Electronics**

M.Sc. Physics (MSCPH)

2nd Semester Examination, 2023 (June)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

### **SECTION–A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. (a) What is the feedback element in an Op-amplifier integrator?

- (b) For a constant input voltage to an integrator, why is the voltage across the capacitor is linear?
2. What is the operational amplifier? What is the general purpose of Op-Amplifier? What is the packaging and pinouts of Op-Amp.?
  3. What are the transistors? Explain the structure and working principle of PNP transistor. Also explain the input and output characteristics of PNP transistor in Common Collector configuration.
  4. What is MOSFET? Explain how MOSFET functions? Explain the three regions of operation of a MOSFET. What is drain and transfer characteristics?
  5. (a) If an operational amplifier, the amplifier gain is 10,000. The input series resistance is  $100\text{ k}\Omega$ . and the feedback resistance is  $500\text{ k}\Omega$ . If the input voltage is 1 volt, find the exact output voltage and percentage error, considering an infinite gain for the amplifier.  
  
(b) A certain signal source, which has zero output impedance, delivers an output voltage of 1 volt, and a maximum current of 10 mA. Design an amplifier which will develop an output voltage of 10 volt when driven by that source.

## SECTION-B

### (Short Answer Type Questions)

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. What are the main constructional differences between a MOSFET and a BJT? What effect do they have on the current conduction mechanism of a MOSFET? Write down advantages of MOSFET.
2. Discuss construction, working principle and V-I characteristics of Zener diode. Define voltage regulation. How Zener diode used as a voltage regulator in power supply system?
3. What is the difference between in Light Emitting Diode and Photodiode? Describe and sketch the working principle of each diode.
4. How many types of ICs? Explain each type of IC with diagram. What is the CMOS technology for devices?
5. What is Epitaxial Growth and Isolation Diffusion, Explain it? How to improve the device performance from Epitaxial films?

6. What is a charge-coupled device (CCD)?
  7. What are the rectifiers? Explain the advantages and disadvantages of active rectifiers versus passive rectifiers?
  8. What is universal high resistance voltmeter?
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