**22CHP104N**

# PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

## MSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **CHEMISTRY**

## BASICS ELECTRONICS FOR CHEMISTS

Time: Three Hours Maximum: 75 Marks

**SECTION-A (10 Marks)**

Answer **ALL** questions

**ALL** questions carry **EQUAL** marks (10 × 1 = 10)

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 1 | The rectifier which converts only one half of the AC cycle into DC is called<br>a) Full-wave rectifier b) Half-wave rectifier<br>c) Bridge rectifier d) Center-tapped rectifier | K1 | CO1 |
| 2 | Zener diode operates primarily in the _____ region.<br>a) Forward bias b) Breakdown<br>c) Cutoff d) Active | K2 | CO1 |
| 3 | The ideal input impedance of an op-amp is<br>a) Zero b) Infinite<br>c) Very low d) 10 | K1 | CO2 |
| 4 | In an inverting amplifier, the output is<br>a) In phase with input b) Out of phase by 180°<br>c) Shifted by 90° d) Not related | K2 | CO2 |
| 5 | The binary equivalent of decimal number 13 is<br>a) 1100 b) 1101<br>c) 1110 d) 1011 | K1 | CO3 |
| 6 | A flip-flop is a<br>a) Combinational circuit b) Sequential circuit<br>c) Amplifier circuit d) Rectifier circuit | K2 | CO3 |
| 7 | A decade counter completes one cycle after counting<br>a) 8 pulses b) 10 pulses<br>c) 12 pulses d) 16 pulses | K1 | CO4 |
| 8 | D/A converters convert<br>a) Analog to Digital b) Digital to Analog<br>c) Binary to Hexadecimal d) Current to Decimal | K2 | CO4 |
| 9 | A spectrophotometer is used to measure<br>a) Electrical conductivity b) Absorbance of light<br>c) Mechanical force d) Temperature | K1 | CO5 |
| 10 | A digital thermometer works on the principle of<br>a) Thermoelectric effect b) Piezoelectric effect<br>c) Hall effect d) Photoelectric effect | K2 | CO5 |

**Cont...**

## SECTION - B (35 Marks)

Answer **ALL** questions
**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 11.a. | Explain the working of a PN junction diode and draw its V-I characteristics. | K2 | CO1 |
| | (OR) | | |
| 11.b. | Describe the operation and characteristics of a Zener diode as a voltage regulator. | | |
| 12.a. | Explain the operation of an inverting and non-inverting amplifier using op - amps. | K3 | CO2 |
| | (OR) | | |
| 12.b. | Describe the operation of an automatic street light using LDR and transistor. | | |
| 13.a. | Explain the working of basic logic gates with truth tables. | K3 | CO3 |
| | (OR) | | |
| 13.b. | Describe the concept of a digital clock using flip-flops as frequency dividers. | | |
| 14.a. | Explain the construction and working of a decade counter. | K4 | CO4 |
| | (OR) | | |
| 14.b. | Discuss the principle of a D/A converter using the weighted resistor method. | | |
| 15.a. | Explain the working of a digital voltmeter and its advantages. | K4 | CO5 |
| | (OR) | | |
| 15.b. | Describe the construction and working of a pH meter. | | |

## SECTION -C (30 Marks)

Answer **ANY THREE** questions
**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

| Question No. | Question | K Level | CO |
|---|---|---|---|
| 16 | With a neat circuit and waveform, explain the working of a full-wave bridge rectifier. | K4 | CO1 |
| 17 | Describe the working of an astable multivibrator using a 555 timer. | K4 | CO2 |
| 18 | Design a JK master-slave flip-flop and explain its functioning in detail. | K4 | CO3 |
| 19 | Explain the working of a counter-type A/D converter with a neat diagram. | K4 | CO4 |
| 20 | With a neat block diagram, explain the working principle and applications of a spectrophotometer. | K4 | CO5 |

Z-Z-Z END