

Seat No. : \_\_\_\_\_

**AG-128**

**April-2015**

**B.Sc., Sem.-VI**

**PHY-311 : Physics & Electronics (Sec-B)  
Instrumentation**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
(2) Symbols have their usual meanings.  
(3) Figure on the right side indicates marks.

1. (a) What is transducer ? Give the classification of transducers based on electrical principle involved and method of energy conversion. Explain the construction, working, advantages and application of Linear Variable Differential Transformer. (LVDT) **10**

**OR**

Explain working and construction of resistive position transducer and resistive pressure transducer.

A position transducer with a shaft stroke of 100 mm has total resistance of 10 k $\Omega$  and voltage across it is 10 V. When the slider is 25 mm from upper end, what is the voltage across it ?

- (b) What is strain gauge ? Explain its construction, working principle, advantages and gauge factor. A wire strain gauge with a gauge factor  $K = 4$  is bonded to a steel member which is subjected to a strain of  $10^{-18}$ . If original no. strain resistance of the gauge is 150  $\Omega$ , calculate the change in gauge resistance. **10**

**OR**

Explain the principle, construction, working advantages, disadvantages, and applications of bulk type photo conductive cells.

2. (a) What are analog and digital meters ? Explain the working of the basic meter movement with its characteristics. Draw the circuits of basic meter movements as a DC ammeter, DC voltmeter and ohmmeter. **10**

**OR**

What is DVM ? Explain the working of dual-slope DVM with the help of its block diagram.

- (b) How the basic meter movement is used as a DC current meter. Derive the expression for  $R_{sh}$  to increase its DC current measuring range. Calculate shunt resistance and multiplying factor of the shunt to convert a 5 mA meter with  $20 \Omega$  internal resistance into a 5 A ammeter. **10**

**OR**

How the basic meter movement is used as a DC voltmeter. Derive the expression for  $R_{se}$  and voltage multiplication  $m$ . Calculate  $R_{se}$  if a 50 mA meter movement with an internal resistance of 1K is to be used as a DC voltmeter of range 50 V.

3. (a) Explain the working of a laboratory type square wave and pulse generator with the help of its block diagram. **10**

**OR**

What is signal generator ? Write the requirement of signal generator, and frequency band limits.

Prepare oscillators classification chart and write the frequency generation range of each oscillator circuit.

- (b) Explain the working of laboratory type square and pulse generator using its block diagram. **10**

**OR**

(i) Draw the neat and clean block diagram of standard signal generator and explain working of each block in precise. **6**

(ii) What is random noise ? Draw the block diagram of random noise generator. **4**

4. Answer in short :

- (1) Identify transducers from following : **1**  
 (i) Loud speaker (ii) Video camera (iii) Micro phone (iv) Radio receiver  
 (v) Thermocouple.
- (2) What is p-n junction without bias called ? **1**
- (3) What is p-n junction with reverse bias called ? **1**
- (4) Define and state duty cycle. **1**
- (5) How does the square wave and pulse differ from each other ? **2**
- (6) What do you mean by  $3\frac{1}{2}$  digit DVM ? **1**
- (7) What happens to output voltage of a circuit if it is measured with low impedance voltmeter ? **1**
- (8) Give three names of temperature transducer. **1**
- (9) Draw the circuit diagram of a stable multivibrator. **1**