LH-124

April-2014

B.Sc. Sem.-VI

Elective-311-A : Physics & Electronics

(Experimental and Measurement Techniques)

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions are compulsory.
(2) All questions carry equal marks.
(3) Symbols used have definite meanings.

1. (a) What is systematic error ? Discuss, how systematic errors arising from experimental design. **7**

OR

Why repeated measurements of a quantity are required ? Obtain the expression of average value, mean deviation, sample variance and sample mean.

(b) Discuss about different statistical distribution functions. **7**

OR

What do you mean by sample distribution and parent distribution ? Discuss about the standard deviation.

2. (a) Discuss about the parameters in terms of which the characteristics of a transducer are defined. **7**

OR

Write a note on resistance thermometers.

(b) What are thermistors ? Give their characteristics. **7**

OR

What do you mean by semiconductor temperature sensors ? Discuss about transistor connections for it and obtain expression of collector current.

3. (a) Explain multistage diffusion pump with necessary diagram. **7**

<div align="center">**OR**</div>

Show that time for monolayer coverage is

$$t_m = 3.79 \times 10^{-23} \frac{S}{\beta P} \sqrt{TG}$$

(b) What is pumping speed ? Show that the pressure at time t for a pump speed S and ultimate pressure P_u is

$P = P_o \exp - (s/v) \, t$ **7**

<div align="center">**OR**</div>

Discuss about Pirani and penning cold cathode gauge.

4. Write note on following : (any **two**) **14**
   (1) Random error
   (2) Infrared pyrometers
   (3) Construction of vacuum equipment

5. Answer the following questions in short : **14**
   (1) What is accuracy of a measurement ?
   (2) What is precision ?
   (3) What should be done to assess the origin of uncertainty ?
   (4) What is transducer ?
   (5) Upto what temperature, high temperature measurements are relatively easy ? Why ?
   (6) What do you mean by Golay cell ?
   (7) How RuO_2 thermometer is prepared ?
   (8) How thermocouple junctions can be fabricated ?
   (9) Write a full form of RTD.
   (10) What is the relation between units 1 m bar and pascal (Pa) of pressure ?
   (11) How the operation of vacuum system can be controlled ?
   (12) In vaccum system, how the pressure can be monitored ?
   (13) What is sublimation pump ?
   (14) What is the range of pressure in capacitance gauge ?

LH-124

April-2014

B.Sc. Sem.-VI

Elective-311-B : Physics & Electronics

(Instrumentation)

Time : 3 Hours]   **[Max. Marks : 70**

Instructions :   (1)   **All** questions are compulsory and carry equal marks.

                   (2)   The symbols have their usual meanings.

1.   (a) What is a transducer ? Describe the detailed classification of transducers based on various aspects. **5**

<div align="center">OR</div>

        What is a strain gauge ? Explain the construction and working principle of bonded strain gauge. State the advantages of wire strain gauge.

  (b) With the help of a neat schematic diagram, explain the working of capacitive pressure transducer. Write its advantages and disadvantages. **5**

<div align="center">OR</div>

        Explain the construction and working of LVDT (Linear Variable Differential Transformer). How can LVDT be used to measure the pressure ?

  (c) A metallic strain gauge with a gauge factor of 2 is bonded to a steel member which is subjected to a stress of 10.5×10^9 N/m^2. If modulus of elasticity for steel is 21×10^{12} N/m^2, calculate the fractional change in the resistance of gauge due to the applied stress. **4**

<div align="center">OR</div>

        The hot junction of a thermocouple is shifted from 200 °C to an environment of 700 °C. If the time constant of thermocouple is 1 second, find the temperature of hot junction after time elapse of

        (i)   1 second   (ii) 2 seconds   (iii) 5 seconds

2.   (a) State the advantages of digital instruments over analog instruments. Explain the construction and operating principle of PMMC mechanism. **5**

<div align="center">OR</div>

        How will you convert a moving coil meter into voltmeter ? Derive the necessary equation for the same using a neat circuit diagram. What precautions will you observe when using voltmeter for the practical measurement ?

(b) What do you mean by an electronic voltmeter ? Explain the working of FETVM using a neat circuit diagram. **6**

OR

What is a digital voltmeter ? Write its advantages. Explain the principle of dual slope integration for analog to digital conversion.

(c) It is required to convert 1 mA meter having 50 Ω internal resistance into 20 mA ammeter. Calculate **3**
  (i) the value of shunt resistance
  (ii) multiplying factor.

OR

A 50 μA meter movement with an internal resistance of 1 KΩ is to be used as a dc voltmeter in 5 V range. Calculate
  (i) multiplier resistance required
  (ii) voltage multiplication.

3. (a) Give the classification of the signal generators. Describe the conventional standard signal generator using a neat schematic diagram. **7**

OR

Explain the working of modern signal generator with necessary diagram.

(b) Define a duty cycle for a given waveform. Explain the working of a function generator using a neat scheme diagram. **7**

OR

With help of a neat block diagram, explain the working of laboratory square and pulse wave generator.

4. (a) Write a note on piezoelectric transducer. **5**

OR

What are thermocouples ? Explain the construction and working principle of thermocouple.

(b) Describe how a basic moving coil meter can be used as an ohm meter. **5**

OR

Compare VOM and VTVM.

(c) What is a sweep generator ? Describe its function in brief with a necessary diagram. **4**

OR

Explain how will you generate a pulse waveform using different type of multivibrators.

5. Answer the following questions in short : **14**

   (1)   What is the basic difference between active and passive transducers ?

   (2)   Define a guage factor for a strain gauge.

   (3)   What is an electromagnetic flow meter ?

   (4)   What will be the sensitivity of 50 μA d' Arsonval meter movement ?

   (5)   What is an Ayrton shunt arrangement ?

   (6)   What are the difference between AC and DC voltmeters ?

   (7)   What is the difference between a pulse and a square wave ?

   (8)   What do you mean by a loading effect of a voltmeter ?

   (9)   On which factor does the frequency accuracy and frequency stability of signal generator depend ?

   (10) How is the function generator different from a signal generator ?

   (11) What do you mean by a time constant of a thermocouple ?

   (12) Which are the materials used as resistance temperature detectors (RTD) ?

   (13) What is the principle of self generating inductive transducer ?

   (14) How are the gauge factor and sensitivity of a strain gauge related with each other ?

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April-2014

B.Sc. Sem.- VI

Elective-311-C : Physics & Electronics

(Visual Basic)

Time : 3 Hours]   **[Max. Marks : 70**

1.   (a)   Explain uses of Visual Basic in Education.   **7**
   <div align="center">**OR**</div>
         Explain various types of variable available in VB.
     (b)   Define the term title bar & form designer.   **7**
   <div align="center">**OR**</div>
         Explain Check Box & Frame control in VB.

2.   (a)   Write short note on if-then statement in VB.   **7**
   <div align="center">**OR**</div>
         Write a VB script to print first 50 natural numbers.
     (b)   Explain File Menu in VB.   **7**
   <div align="center">**OR**</div>
         Explain the uses of following :
         (1)   Window menu   (2)   Edit menu   (3)   Run menu

3.   (a)   Write a VB script to print any two digit odd numbers.   **7**
   <div align="center">**OR**</div>
         Write a VB script to prepare a simple calculator.
     (b)   Explain Option Button and List Box Controls in VB.   **7**
   <div align="center">**OR**</div>
         Write a note on Implicit type declaration statement.

4.   (a)   Explain code window and how we execute that window ?   **7**
   <div align="center">**OR**</div>
         Explain view menu in VB.
     (b)   Write a VB script to calculate factorial of first 5 numbers.   **7**
   <div align="center">**OR**</div>
         Write note on for loop in VB.

5.   Answer in short :   **14**
     (1)   Write short cut key to save any project.
     (2)   Write short cut key to print any project.
     (3)   Write short cut key to cut any portion of any form.
     (4)   Write short cut key to paste any portion within that form.
     (5)   Default form name in VB.
     (6)   How we change caption property ?
     (7)   How we remove properties window ?

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LH-124

April-2014

B.Sc. Sem.- VI

Elective-311-D : Physics & Electronics
(Modern Communication)

Time : 3 Hours] [**Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.
(2) The symbols have their usual meanings.
(3) Figures to the right indicate marks.

1. (a) Discuss BORSCHT functions in the subscriber interface with block diagram. **7**

    OR

    Draw the block diagram of basic telephone set. Explain its transmitter and receiver.

   (b) Explain the Cordless Telephone with block diagram. **7**

    OR

    With a PBX block diagram explain private telephone system.

2. (a) Define multiple access. Explain frequency reuse, FDMA & TDMA used in cellular system with diagrams. **7**

    OR

    Draw the block diagram of the advance mobile phone system (AMPS) & describe its operational procedure.

   (b) What do you mean by Cellular Telephone System ? With diagram explain cellular concepts. **7**

    OR

    In 2.5 G cell phone system, describe GPRS & EDGE. Explain what makes EDGE faster than GPRS.

3. (a) List the main applications of Internet and describe them briefly. **7**

    OR

    Write a note on Storage Area Networks.

   (b) Explain transmission systems used in the Internet. Explain Frame Relay & Routers. **7**

    OR

    Discuss Internet Backbone in detail.

4. (a) Explain types of networks in detail. **7**

   OR

   Describe how repeaters, hubs, bridges & gateways are used in LAN.

   (b) Explain star topology, ring topology & bus topology in detail with block diagram. **7**

   OR

   Explain types of WLANs with block diagram.

5. Attempt any **Fourteen** : **14**

   (1) Define : Local Loop.

   (2) Give full form of DTMF.

   (3) What is Voice Mail ?

   (4) Give full form of PABX.

   (5) What is MTSO ?

   (6) Define : Frequency Reuse.

   (7) What is NAM ?

   (8) Give the full form of UMTS.

   (9) What is SONET ?

   (10) Give full form of FTP.

   (11) What is TCP/IP ?

   (12) What is MAC address ?

   (13) Define : Network.

   (14) What is Switch ?

   (15) Give full form of VoIP.

   (16) What is P2P in WiMAX ?