Time:3 hrs.   Max.Marks: 75

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1.   **a)** List out the Basic Theorems and Properties of Boolean Algebra. Justify with the
         Proof   **(15M)**

Or

   b) Explain how 1's complement and 2's complement of a binary number is obtained?
         Illustrate by an example.   **(7M)**

   c) What is gray code? What are the rules to construct gray code? Develop the 4 bit
         gray code for the decimal 0 to 15.   **(8M)**

2   **a)** Using K-map method determine the prime Implicant and obtain the possible minimal
         expression for the following function
         $F(A,B,C,D) = \Sigma\ m(8,12,13) + d(1,2,4,6,7,11)$ **(15M)**

Or

   b) Define the following terms with respect to K-Map with an example.
      i) Prime Implicant ii) Redundant terms iii) Essential Prime Implicant iv) Octet   **(15M)**

3.   **a)** Design 4 line to 16 line decoder using 2 line to 4 line decoders.   **(7M)**
   b) Implement the following switching function using a Four input multiplexer
         $F (A, B, C, D) = \Sigma\ m (0, 1, 2, 4, 6, 9, 10, 13, 14)$ **(8M)**

Or

   c) Implement a full adder with two 4×1 multiplexers.   **(7M)**
   d) Implement Half adder using NAND gates.   **(8M)**

4.   **a)** Draw and explain 4-bit universal shift register   **(7M)**
   b) Explain different types of shift registers   **(8M)**

Or

   c) Explain the working of a master-slave JK flip flop. State its advantages   **(8M)**
   d) Implement the following Boolean functions using PAL
         $F_1 (x, y ,z) = \sum m (0,1,3,6,7)$ and $F_2 (x, y ,z) = \sum m (0,2,3,5)$ **(7M)**

SECTION- B (5×3=15M)
Answer any FIVE Questions

5.

   a) Perform $(28)_{10} - (15)_{10}$ using 6 bit 2's complement representation.

   b) Convert $(12.125)_{10}$ into binary

   c) What are the limitations of K-maps?

   d) Convert the given expression in standard POS form. $f(A,B,C) = (A+B) (B+C) (A+C)$

   e) Explain about parallel adder.

   f) What is meant by encoder?

   g) Compare PLA with PROM?

   h) What is meant by race around condition in flip-flops?

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
II BTech (EIE) I Semester
BTEIE302 FUNDAMENTALS OF INSTRUMENTATION
MODEL QUESTION PAPER

Time:3 hrs.   **Max.Marks: 75**

SECTION - A (4 X 15 = 60 M)
Answer ALL Questions

1.   **a)** With a neat diagram, briefly explain the elements of generalised
            measurement system.
Or
            b) Discuss different types of errors in measurement.

2.   **a)** Explain any four Static characteristics of a measuring system?
Or
            b) Explain the dynamic response of a first order system for standard inputs.

3.   **a)** What is a transducer? With a neat diagram, explain the principle and
            working of an LVDT.
Or
            b) What is strain gauge and gauge factor. Derive the expression for
            calculation of gauge factor.
4.   **a)** Discuss about Fibre optic transducers
            b) Smart sensors.
Or
            c) What are the objectives of data acquisition system?

SECTION - B (5×3=15M)
Answer any FIVE Questions

5.
     a) Differentiate between null and deflection type instruments.
     b) Briefly discuss about resistance and current standards.
     c) What are the various Dynamic characteristics of an instrument?
     d) Differentiate between sensor and a transducer.
     e) Briefly explain about bonded and unbounded strain gauges.
     f) Write a note on computer-aided measurement and its importance in instrumentation.
     g) Briefly explain the role of A / D and D/A converters in instrumentation systems.
     h) Explain about sample and hold circuits.

Time: 3hrs.   Max. Marks: 75

SECTION-A (4 X 15 = 60 M)
Answer ALL Questions

1.   **a)** Briefly Explain various features of Object Oriented Programming Language   **(15M)**
                                            Or
      b) Define Function. Explain various types of functions used in C++   **(15M)**

2.   **a)** What is Class? Explain data hiding in Classes   **(15M)**
                                            Or
      b) What is Constructor? Write the syntax of declaring the Constructor and Explain
          various types of Constructors used in C++   **(15M)**

3.   **a)** Explain different forms of Inheritance. Illustrate each type with an example   **(15M)**
                                            Or
      b) What is Virtual Function? Why it is important to make a class virtual   **(15M)**

4.   **a)** What is file mode? Describe the various file mode options available in C++   **(7M)**
      b) Explain the various unformatted I/O Operations and Formatted Console
          I/O Operators   **(8M)**
                                            Or
      c) What is Template? Explain the various templates with example   **(8M)**
      d) Write a function template for finding the minimum value contained in an array   **(7M)**

SECTION - B (5×3=15M)
Answer any FIVE Questions

5.   **Write short notes on**
      a) Applications of OOP
      b) Scope Resolution Operator
      c) Friend Function
      d) Operator Overloading
      e) Virtual Base Class
      f) Pure Virtual Function
      g) Command Line Arguments
      h) Overloading of Template Functions

Time:3 hrs.   **Max.Marks: 75**

SECTION - A (4 X 15 = 60 M)
Answer ALL Questions

1.   **a)** Obtain the expressions for star-delta and delta-star equivalence of resistive
          network   **(7M)**
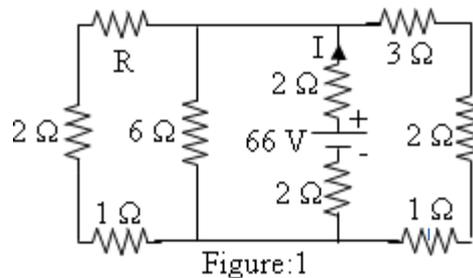   **b)** Find the value of resistance R, if the current is I=11 A and source voltage is 66 V
          as shown in figure: 1   **(8M)**

Figure:1

Or

c) Discuss the concept of source transformation technique   **(8M)**
d) Find the equivalent resistance between the terminals Y and Z in Figure 2   **(7M)**
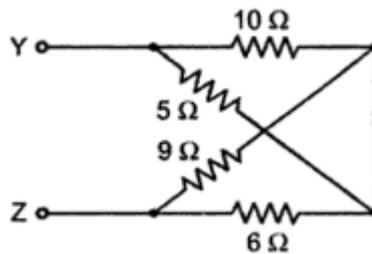
Figure: 2

2.   **a)** Explain the dot convention in coupled circuits.   **(7M)**
          b) Two Coupled Coils have Self-Inductances $L_1 = 10 \times 10^{-3}$ H and $L_2 = 20 \times 10^{-3}$ H. The
          Coefficient of coupling(K) being 0.75 in the air, find the voltage in the second
          coil and the flux of first coil provided the second coil has 500 turns and the circuit
          current is given by $i_1 = 2Sin314t$ A.   **(8M)**

Or

c) Find the RMS value of the current waveform of Figure 3. If this current flows
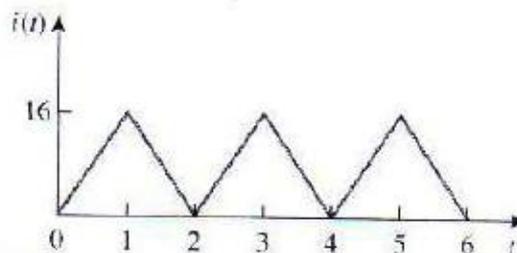through a 9-Ω resistor, calculate the average power absorbed by the resistor.   **(8M)**

Figure: 3

d) A resistance of 12 Ω, an inductance of 0.15 H and capacitance of 100 μF are connected in series across 200 V, 50 Hz supply. Calculate
    (i) current (ii) power factor of the current
    (iii) voltage drop across resistance, inductance and capacitance
    (iv) draw the complete phasor diagram of the circuit.   **(7M)**

3.   **a)** An RLC series circuit with a resistance of 10 Ω, inductance of 0.2H and a capacitance of 40 μF is applied with a 100 V supply at variable frequency. Find the following with respect to the series resonant circuit
    (a) Frequency at which resonance takes place
    (b) Current
    (c) Power
    (d) Power factor
    (e) Quality factor
    (f) Half power frequencies.   **(15M)**

Or

b) Draw the current locus for a series RL circuit.   **(7M)**

c) Determine the current supplied by the source at resonance for the circuit shown in Figure 4.   **(8M)**
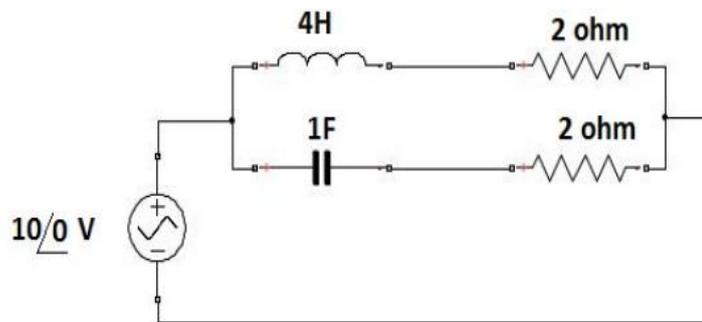

Figure: 4

4.   **a)** Explain the procedure to form the tie-set matrix of the given network. Discuss the advantages of tie-set matrix   **(7M)**

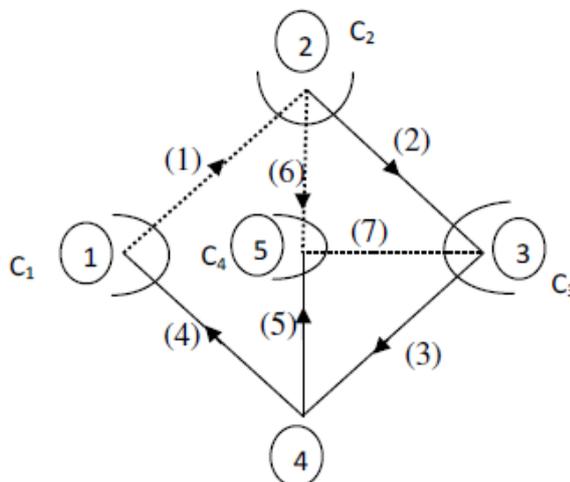**b)** Formulate the fundamental cutset matrix for the graph shown in Figure 5   **(8M)**

Figure: 5

Or

c) State and explain Super position theorem. **(7M)**

d) In the network shown in Figure 6 the impendence 5+j2 ohm is changed to 1+j1 ohm, find the change in current drawn from the supply by direct calculation and then verify by the compensation theorem **(8M)**
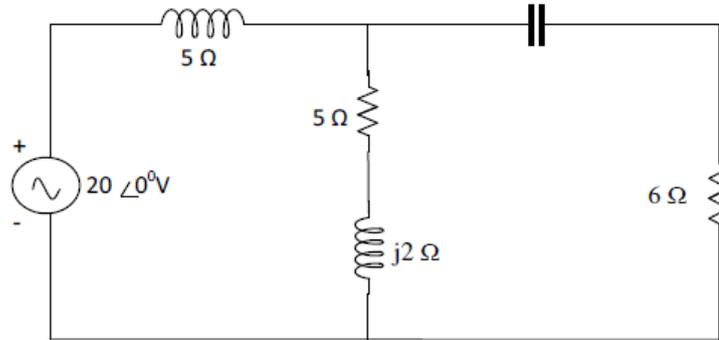

Figure: 6

SECTION - B (5×3=15M)

Answer any FIVE Questions

5.

    a) What are linear and non-linear elements? Give an example of each

    b) State Kirchhoff's laws. What are its limitations?

    c) State Faraday's laws of electromagnetic induction.

    d) Define phase angle and phase difference.

    e) Define the quality factor. What is its significance?

    f) A coil of 20 Ω resistance and 0.2 H inductance is connected in parallel with a capacitor of 100 μF capacitance. Find the frequency of resonance and the effective impedance at resonance.

    g) State the limitations for Thevenin's theorem.

    h) A connected graph has 9 branches and 4 branch currents which are independent. Find the number of nodes.

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
II BTech (EIE) I Semester
BTEIE305 ELECTRONIC MEASUREMENTS
MODEL QUESTION PAPER

Time:3 hrs.   **Max.Marks: 75**

SECTION - A (4 X 15 = 60 M)
Answer ALL Questions

1.   **a)** Explain the importance of statistical analysis of measurement data in measurement
Or
b) Classify and explain the different types of standards and measurement.

2.   **a)** Explain the need for calibration and explain different types of calibration of an instrument.
Or
b) explain the process of calibration of voltmeter and ammeter.

3.   **a)** What is frequency synthesizer and describe its types with circuits in detail.
Or
b) Describe the circuit of Kelvin's double bridge used for measurement of low resistance. Derive the conditions for balance.
c) An alternate current bridge is arranged as follows: the arms AB and BC consists of non-inductive resistances of 100-ohms each, the arms BE and CD of non-inductive variable resistances, the arm EC of a capacitor of 1microfarad capacitance, the arm DA of an inductive resistance. The alternating current source is connected to A and C and the telephone receiver to E and D. a balance is obtained when resistances of arms CD and BE are 50 and 2500 ohms respectively. Calculate the resistance and inductance of arms DA.

4.   **a)** With a neat block diagram explain the function of a general purpose oscilloscope. Write its applications.
Or
b) Describe the working of a spectrum analyzer with its basic circuit. Explain various applications of the spectrum analyzer.

SECTION- B (5×3=15M)
Answer any FIVE Questions

5.

   a) Explain the standards of luminous intensity and temperature.
   b) Briefly discuss about IEEE standards.
   c) Explain the need of testing of an instrument.
   d) Discuss any one –Wave analyzer in detail
   e) Explain any one bridge circuit for measurement of inductance.
   f) What is the principle of sampling oscilloscope?
   g) Explain the principle and working of a logic analyzer.
   h) Explain how the Q-meter can be used for the measurement of Q-factor

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
II B. Tech (EIE) I Semester
BTEIE306 FOURIER AND COMPLEX ANALYSIS
MODEL QUESTION PAPER

Time:3 hrs.   Max.Marks: 75

SECTION- A   (4 X 15=60 M)
Answer ALL Questions

1.   **a)** Prove that if f(z)=u(x,y)+iv(x,y) is differentiable at z then at this point the first
         order partial derivatives of u and v exist and satisfy Cauchy-Riemann
         Equations   **(8M)**
      b)   Show that $u(x,y)=x^3-3x^2$ is harmonic and find it's harmonic conjugate and
      corresponding analytic function   **(7M)**

                                                   Or

      c) Prove that the function f(z) defined by

$$f(z) = \begin{cases} \dfrac{x^3(1+i)-2y^3(1-i)}{x^2+y^2} & if\ z \neq 0 \\ 0 & if\ z = 0 \end{cases} ;$$

         Is continuous and Cauchy-Riemann equations are satisfied at the origin but f'(0) does
         not exists   **(8M)**

      d) Find Holomorphic function f(z) whose imaginary part is $v(x,y)=e^x \sin y$ using

         Milne-Thomson method.   **(7M)**

2.   **a)** Evaluate $\int_c \frac{2z+1}{z^2+z}$ dz where C: $|z| = \frac{1}{2}$ by Cauchy integral formula.   **(7M)**

      b) Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and residue at each pole.   **(8M)**

                                                   Or

      c) Find the Laurent's expansion of $f(z) = \frac{7z-2}{(z+1)z(z-2)}$ in the region 1 < z+1 < 3.   **(7M)**

      d) Evaluate $\int_c tanz\ dz$ where c is the circle |z|=2 by residue theorem.   **(8M)**

3.   **a)** Evaluate $\int_0^\infty \frac{\cos ax}{x^2+1} dx$ **(8M)**

      b) Find the bilinear transformation which maps the points z=(1,i,-1) onto the points
         w=(I,0,-i). Hence find the image of |z|<1.   **(7M)**
                                                   Or
      c) Prove that $\int_0^{2\pi} \frac{1}{1-2r\cos\theta+r^2} d\theta = \frac{\pi}{1-r^2}$ **(8M)**

      d) Find the bilinear transformation which maps the points (1,I,-1) to (2,I,-2) respectively.
         Find fixed and critical points of the transformation   **(7M)**

4.   **a)** Find a Fourier Series expansion for f(x),

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases} ;$$ **(8M)**

b) Find the Fourier sine transform of $e^{-|x|}$.

Hence show that $\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}, m > 0$ **(7M)**

Or

c) Find the Fourier cosine series expansion of $x \sin x$ in $(0, \pi)$.

Hence show that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \cdots \infty = \frac{\pi-2}{4}$.   **(8M)**

d) Find the Fourier transform of
$$f(x) = \begin{cases} 1 - x^2 & ,|x| \le 1 \\ 0 & ,|x| > 1 \end{cases};$$

Hence evaluate $\int_0^\infty \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$ **(7M)**

SECTION- B (5 X 3=15M)
Answer Any FIVE Questions

5.

    a) Show that the function $f(z)=\bar{z}$ is nowhere analytic.

    b) Prove that $u(x,y) = \cos x \cosh y$ is harmonic function.

    c) Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along the real axis to 2 and then vertically to 2+i.

    d) Find Taylor's expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about the point z=i.

    e) Find the fixed points of the transformation $w = (z - i)^2$.

    f) Find $\oint_c \frac{1}{4z-1} dz$ counter clockwise where C is the unit circle.

    g) Express f(x)=x as a half-range cosine series in 0<x<2.

    h) Write some properties of Fourier transforms.