Con. 2511–09. (REVISED COURSE) VR–3276

(3 Hours) [Total Marks : 100

Electrical Measurement & Measuring Instruments

N.B. : (1) Question No.1 is **compulsory**.
(2) Attempt any **four** questions out of **remaining** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. Solve any four :– 20
   (a) Define limiting error. Derive an expression for relative limiting error.
   (b) Compare spring and gravity control methods of producing the deflecting torque.
   (c) Define the following terms related to the instrument transformer :–
      (i) Ratio error
      (ii) Phase angle error.
   (d) Justify "Hay's bridge is suitable for measuring inductance of high Q. coils."
   (e) Explain how wattmeter is calibrated by using d.c. potentiometer.

2. (a) Explain the construction and working of fluxmeter. What are the advantages and disadvantages ? 10
   (b) Explain the construction, working and phasor diagram of a Maxwell-Inductance-capacitance bridge for the measurement of self inductance. 10

3. (a) Explain the construction, working and theory of Ballistic galvanometer. 10
   (b) A moving coil instrument gives a full scale deflection of 10mA when the potential difference across its terminal is 100 mV. Calculate (i) shunt resistance for a full scale deflection corresponding to 100A. (ii) the series resistance for full scale reading with 1000 V. (iii) calculate the power dissipation in each case. 10

4. (a) Explain the construction and working of single-phase Induction type energymeter. 10
   (b) The inductance of a moving iron Ammeter with a full scale deflection of 90° at 1·5A is given by $L = (200 + 400 - 40^2 - \theta^3)\ \mu H$. Where θ is the deflection in radian from zero position. Estimate the angular deflection of the pointer for a current of 1·0A. 10

5. (a) Explain the construction and working CT. 10
   (b) Explain how iron loss is measured with Epstein Square method. Also explain its construction. 10

6. Write a short notes (any two) :– 20
   (a) Rectifier type instrument
   (b) Reed type frequency meter
   (c) Weston type synchroscope.

SE(E) Sem III (old) 26/5/09

ws April 09 208 Electrical Measurements & Measuring Instruments

lib exam

Con. 2510–09. (OLD COURSE) VR–3052

(3 Hours) [Total Marks : 100

MASTER

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

Page (1)

1. (a) Derive relationship between electrostatic and electromagnetic system of units. Aslo obtain dimensions of capacitance, resistance and inductance in electrostatic system. 10
(b) Define "Guarantee Error". Explain types of errors with appropriate examples. 10

2. (a) Explain "Diamagnetism, Paramagnetism and Ferromagnetism". 10
(b) What is B–H curve. Explain any one method of plotting B–H curve. What information is derived from the curve ? 10

3. (a) Explain basic operation, measurement errors, limitations and applications of Wheatstone Bridge. 10
(b) Explain fundamentals of measurements of elements using A.C. bridges with the help of Generalised AC bridge. 10

4. (a) Explain use of copper shading bands in case of Induction type Energy Meters. What is "Creep" ? 10
(b) Explain with neat diagram construction and working of "single phase Electrodynamometer type wattmeter." 10

5. (a) Describe with neat diagram construction and working of PMMC instruments. Derive torque equation. 10
(b) A 5 Amp, 230 Volts meter on full load unity power factor test makes 60 revolutions in 360 seconds. If the normal disc speed is 520 revolutions per kwh. What is the percentage error ? Also comment on speed of disc. 10

6. (a) Explain different applications of D.C. potentiometers. 10
(b) A milliammeter of 2·5 Ω resistance reads up to 100 milliampears. What resistance is necessary to enable it to be used as : 10
(i) A voltmeter reading up to 10 Volts.
(ii) An Ammeter reading up to 10 Amp.
Draw the connection diagram in each case.

7. Write short notes on any **four** :– 20
(a) Synchroscope
(b) Megger
(c) Power factor meter
(d) Errors in CT and PT
(e) Measurement of Low, Medium and High Resistance.

www.campuskeeda.com

(3 Hours) [Total Marks : 100

N.B.: (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

S.E (E&TC) III Old Applied Maths-III 8/6/09 MASTER

1. (a) Use the Laplace transform to evaluate $\int_0^\infty e^{-2t}\frac{(1-\cos 3t)}{4t}\,dt$. 5

(b) Find the complex form of the Fourier Series for $f(x) = e^{ax}$ in $(-\pi, \pi)$. 5

(c) Show that matrix 5

$$A = \frac{1}{9}\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$$ is orthogonal and find its inverse by using adjoint method.

(d) Show that 5
$U = e^x \cos y + y^2 - x^2$ is harmonic function. Find its conjugate harmonic function.

2. (a) Solve by using Laplace Transform $\frac{dy}{dx} + 2y + \int_0^t y\,dt = \sin t$, if $y(0) = 1$. 6

(b) Obtain the half range cosine series for $f(x) = \pi x - x^2$ in $(0, \pi)$. And the result for the Parseval's identity. 6

(c) Find the non-singular matrices P and Q such that PAQ is in the normal form and hence find the Rank of A. 8

where $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

3. (a) Define orthogonal and orthonormal set of functions. Show that 6
$\{\sin nx\}$ $n = 1, 2, 3, \ldots$ is orthogonal set of functions over $[0, \pi]$. Hence construct the orthonormal set of functions.

(b) Verify that $A(\text{Adj. } A) = (\text{Adj } A)\, A = |A|\, I$ 6

where $A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \end{bmatrix}$

(c) Find, (i) $L\left\{\frac{\cosh 4t \sin 4t}{t}\right\}$ (ii) $L\left\{e^{3t}\int_0^t t \sin 3t\,dt\right\}$ 8

4. (a) Obtain the Fourier series for $x \sin x$ in $(-\pi, \pi)$. 6

(b) Reduce matrix A to normal form and find its rank. 6

$$A = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$$

(c) Find— (i) $L^{-1}\left[\frac{2(s+1)}{s^2+2s+10}\right]$ (ii) $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$ 8

[TURN OVER

www.campuskeeda.com

S.E (E&C) III old Applied Maths - III 8/6/09

5. (a) Find the value of λ for which the following system of equations have non zero solution, solve the equations. 6

$$x + 2y + 3z = \lambda x$$
$$3x + y + 2z = \lambda y$$
$$2x + 3y + z = \lambda z$$

(b) If $f(t) = t, \quad 0 < t < 1$
$= 0, \quad 1 < t < 2$
and $f(t + 2) = f(t)$ for $0 < t < 2$
Find L [f(t)]. 6

(c) Prove the following : 8

(i) If f(z) and $f(\bar{z})$ are both analytic functions then f(z) is a constant function.

(ii) The image of reactangular hyperbola $x^2 - y^2 = 1$ under the transformation $w = \frac{1}{z}$ is the Lemniscate $\rho^2 = \cos 2\phi$

6. (a) If f(z) is an analytic function prove that— 6

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^4 = 16 |f(z)|^2 |f'(z)|^2$$

(b) If the matrix 6

$$A = \begin{bmatrix} -4 & -3 & -2 \\ -1 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}$$

Then show that adj(A) is symmetric.

(c) Find Fourier series for 8

$$f(x) = \begin{cases} \pi x & 0 \le x < 1 \\ 0 & x = 1 \\ \pi(x-2) & 1 < x < 2 \end{cases}$$

7. (a) State and prove the convolution theorem in Laplace Transform. 6

(b) Find the Fourier series for $f(x) = x - x^2$ in (0, 3) 6

(c) Show that the relation 8

$$w = \frac{iz + z}{4z + i}$$

transform the real axis of z-plane into a circle of w-plane. Find the point in z-plane which is mapped on the centre of the circle of w-plane.

(2) Attempt any **four** questions from remaining **six** questions.
(3) **Figures** to **right** indicate **full** marks.

S.E.(E&C) III Rev Engg. Maths-III 876/09 MASTER

1. (a) Find Laplace Transform of $\int_0^t \frac{\sin u}{u}\, du$. 5

(b) Find the image of $|z - 3i| = 3$ under the mapping $w = \frac{1}{z}$. 5

(c) Obtain Laurent's series for $f(z) = \frac{4z + 3}{z(z-3)(z+2)}$ in the annular region between, 5
$|z| = 2$ and $|z| = 3$.

(d) Show that sin x, sin 3x, sin 5x, ... form a set of orthogonal functions over 5
$\left[0, \frac{\pi}{2}\right]$. Determine the corresponding orthonormal set.

2. (a) Show that $\int_0^\infty \frac{\cos \lambda x}{\lambda^2 + 1}\, d\lambda = \frac{\pi}{2} e^x$, $x \geq 0$. By definition of Fourier cosine integral. 6

(b) If f(z) is a regular function of z then prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4|f'(z)|^2$. 6

(c) State and prove convolution theorem and hence find 8

$$L^{-1} \frac{(s+3)^2}{(s^2 + 6s + 5)^2}.$$

3. (a) Find Fourier series of 6

$$\begin{aligned} f(x) &= 0 && -2 \leq x \leq -1 \\ &= 1 + x && -1 \leq x \leq 0 \\ &= 1 - x && 0 \leq x \leq 1 \\ &= 0 && 1 \leq x \leq 2 \end{aligned}$$

(b) Evaluate using Cauchy's Integral 6

Formula $\int_c \frac{z^2 + 4}{(z-2)(z+3i)}\, dz$, where c is

(i) $|z + 1| = 2$
(ii) $|z - 2| = 2$

(c) Use Laplace transform method to solve 8

$$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 1, \text{ where } y(0) = 0, y'(0) = 1$$

[TURN OVER

www.campuskeeda.com

4. (a) Using Cauchy's residue theorem evaluate 6

$$\oint_c \frac{\sin \pi z^2 + \cos \pi z^2}{z^2 + 3z + 2}\, dz, \text{ where c is (i) } |z| = 1, \quad \text{(ii) } |z| < 2.$$

(b) Find the analytic function $f(z) = u + iv$, If $v = e^x(x \cdot \sin y + y \cdot \cos y)$. 6

(c) Find the Fourier sine series for unity in $0 < x < \pi$ and hence show that – 8

$$1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \ldots\ldots = \frac{\pi^2}{8}$$

5. (a) Find Inverse Laplace Transform of 6

(i) $\log\left(\frac{s+a}{s+b}\right)$ (ii) $\frac{8e^{-3s}}{s^2+4}$

(b) Using Laplace Transform, Evaluate $\int_0^\infty t^3 e^{-t} \sin t\, dt$. 6

(c) Find the Bilinear transformation that maps the point $z = -i, 0, i$ into the points $w = -1, i, 1$ respectively. Into what curve the y-axis is transformed to this transformation. 8

6. (a) Find the complex form of Fourier series of $f(x) = e^{ax}$ $(-\pi < x < \pi)$ in the form 6

$$e^{ax} = \frac{\sinh a\pi}{\pi} \sum_{n=-\infty}^{\infty} (-1)^n \frac{a + in}{a^2 + n^2} \cdot e^{inx}$$

(b) Show that the image of the rectangular hyperbola $x^2 - y^2 = 1$, under the transformation $w = \frac{1}{z}$ is the lemniscate. 6

(c) Evaluate – 8

(i) $\int_0^\pi \frac{d\theta}{3 + 2\cos\theta}$ (ii) $\int_{-\infty}^{\infty} \frac{dx}{(x^2 + a^2)(x^2 + b^2)}$

7. (a) Find Laplace transform of 6

(i) $t^2 - e^{-2t} + \cosh^2 3t$ (ii) $e^t \cdot \sin 2t \cdot \sin 3t$

(b) If $f(a) = \int_c \frac{3z^2 + 7z + 1}{z - a}\, dz$ 6

where c is a circle $|z| = 2$, then find –

(i) $f(-3)$ (ii) $f(i)$ (iii) $f(1 - i)$ (iv) $f'(1 - i)$

(c) Obtain the Fourier series for the function 8

$f(x) = 0 \quad -\pi \le x \le 0$

$= \sin x \quad 0 \le x \le \pi$

Hence deduce that $\frac{\pi - 2}{4} = \frac{1}{1 \cdot 3} - \frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} - \ldots\ldots\ldots\ldots$

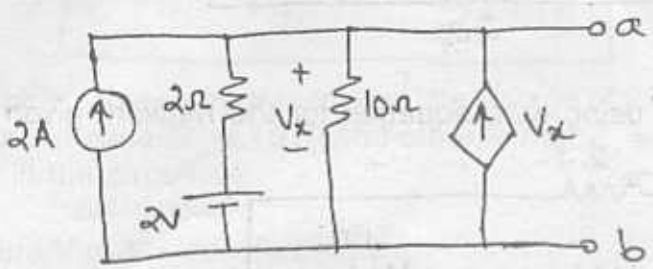
www.campuskeeda.com

(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume **suitable** and state them.

S.E. (E&TC) (Old) Electrical Networks 3/6/09.

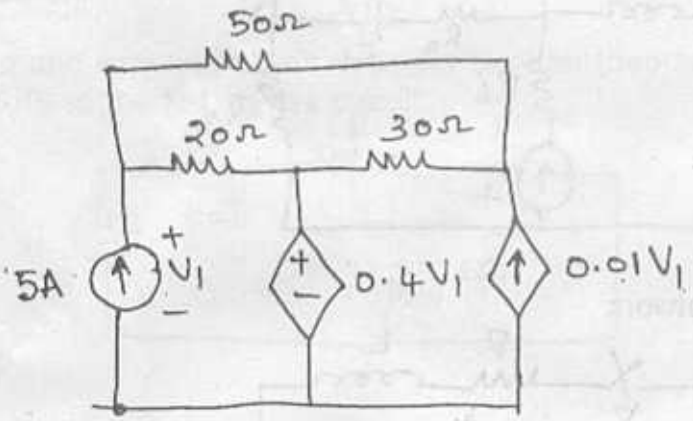
MASTER

1. (a) Find the Thevenin's equivalent across a and b. 10

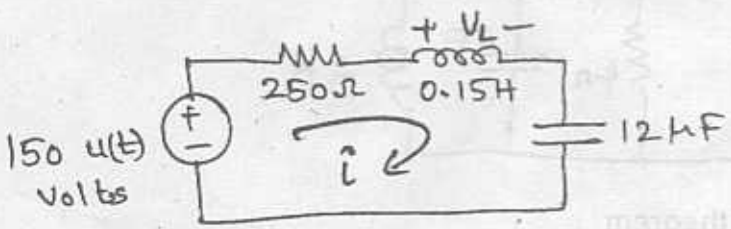


(b) (i) Write short note on initial conditions. 5
(ii) Find the current in a series RL circuit, having R = 2 Ω, L = 10H, while a dc voltage of 100 V is applied. Find the value of current after 5 seconds of switching on. 5

2. (a) Use mesh analysis to find power supplied by dependent voltage source. 10

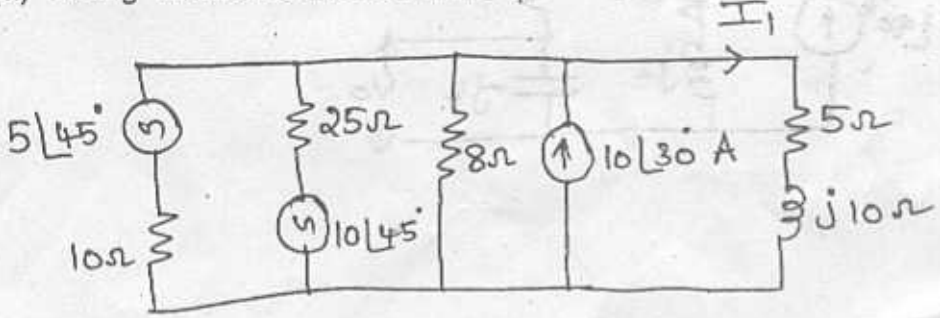


(b) Determine whether the RLC series circuit is underdamped, overdamped or critically damped. Also find $V_L(0^+)$, $\frac{di}{dt}(0^+)$, $i(0^+)$ 10



10

3. (a) Using Millman's theorem find I_1.

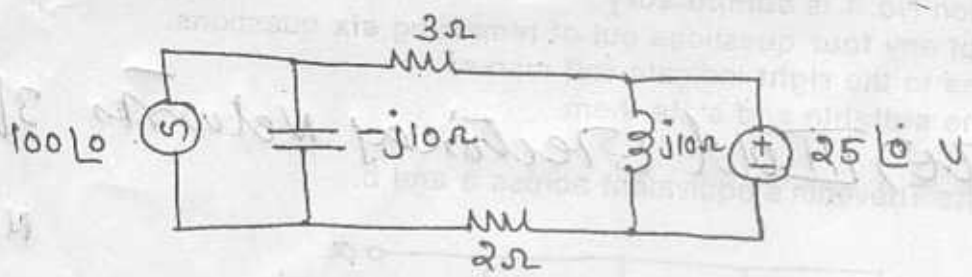


[TURN OVER

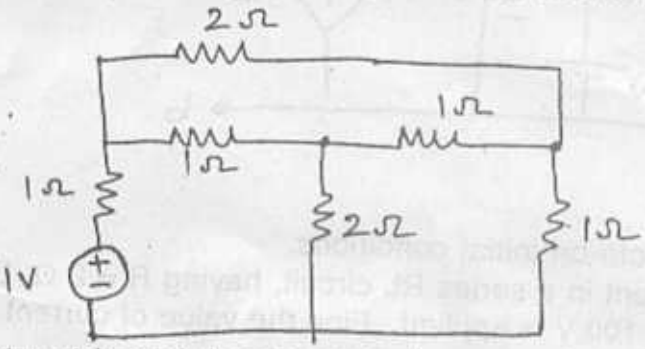
www.campuskeeda.com

S. E (E&TC) II old Electrical Networks 3/6/09 Page

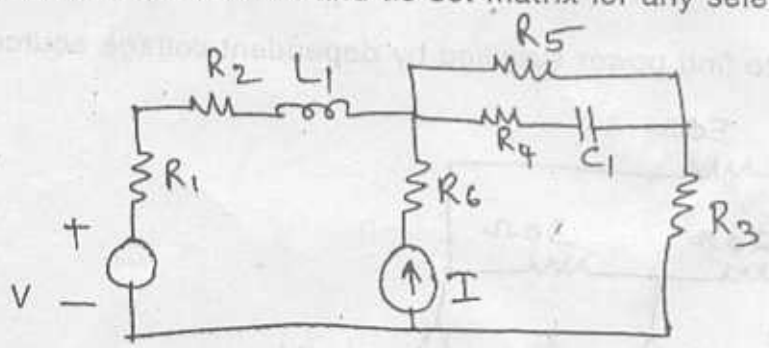
(b) By superposition theorem, determine the current in the 3 Ω resistor. (2) 10



4. (a) Obtain twig voltages using KCL equation for the network given . Choose any tree. 10

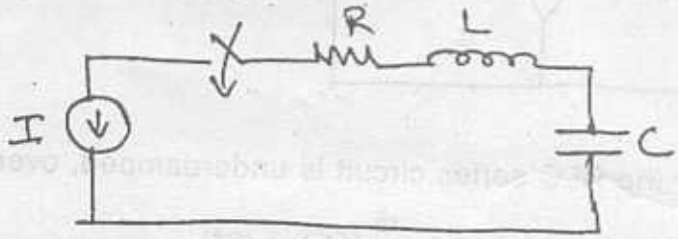


(b) Write cutset matrix and tie set matrix for any selected tree. 10

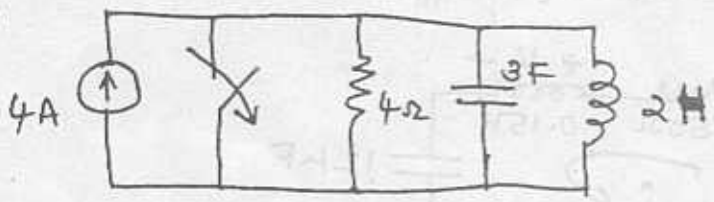


5. (a) Draw the dual network 10

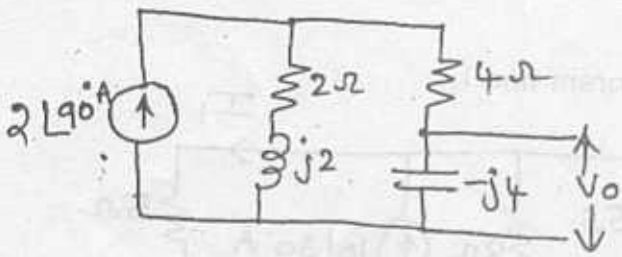
(i)



(ii)



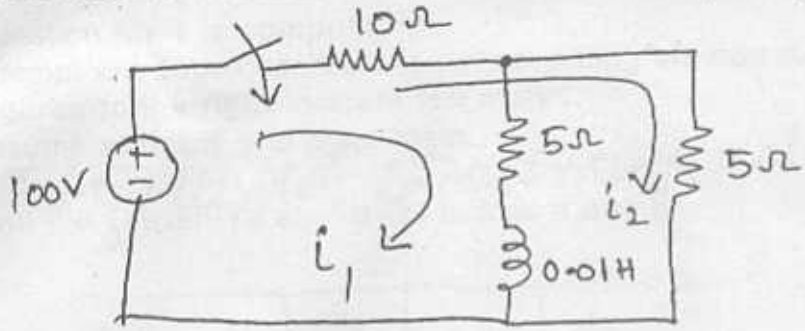
(b) Find V_0 by reciprocity theorem 10



www.campuskeeda.com

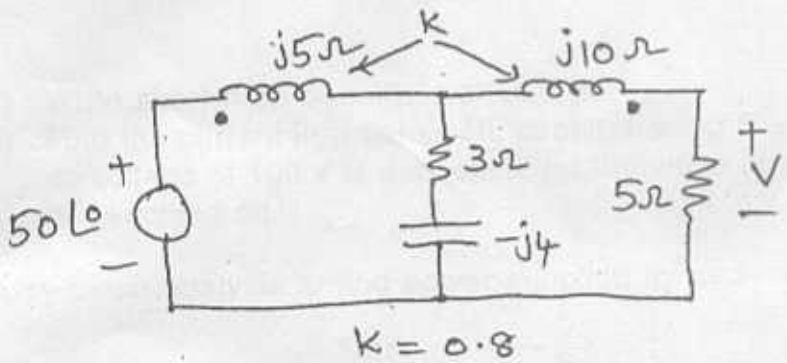
Con.3389-VR-3057-09. S.E.(E&TC) 3rd old Electrical Network 3/6/09.

6. (a) The switch is closed at t = 0. Find the current i_1 and i_2. 10



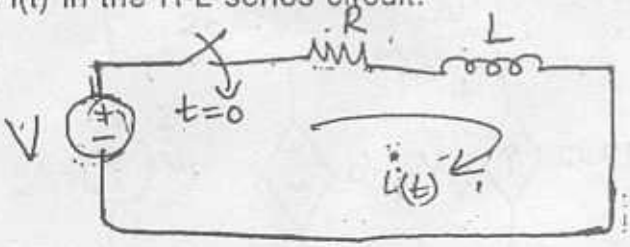
(b) Three phase three wire system has line voltage of 250 V, supplies two balanced load one in delta $Z_\Delta = 15 \lfloor 0$ and other in star $Z_y = 10 \lfloor 30°$. Obtain the total power in the circuit. 10

7. (a) Compute V in the coupled circuit. 10



(b) (i) State and explain maximum power transfer theorem. 4

(ii) Find i(t) in the R-L series circuit. 6



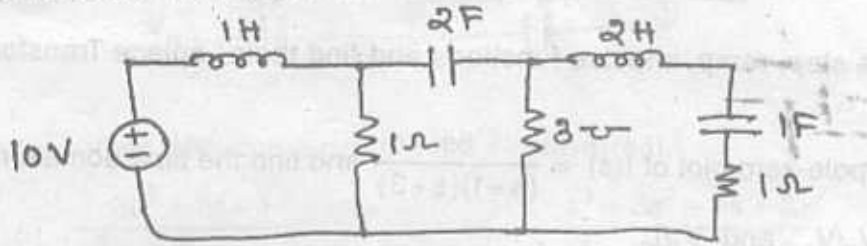
www.campuskeeda.com

(REVISED COURSE)

(3 Hours) [Total Marks : 100

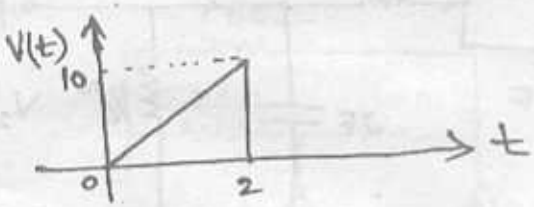
N.B.: (1) Question No. 1 is **compulsory**.
(2) Answer any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicates **full** marks.

1. (a) Draw the dual of the network shown : 20

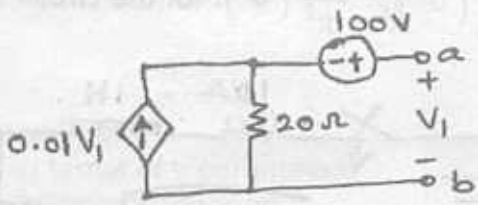


(b) Test whether $P(s) = s^6 + 8s^5 + 3s^4 + 15s^3 + 17s^2 + 12s + 4s$ is Hurwitz.

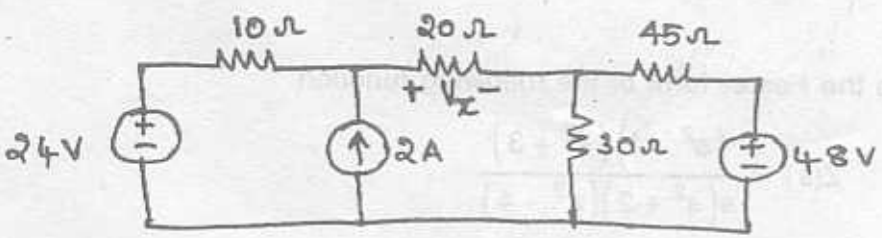
(c) Apply waveform synthesis and find Laplace transform for the following wave form.



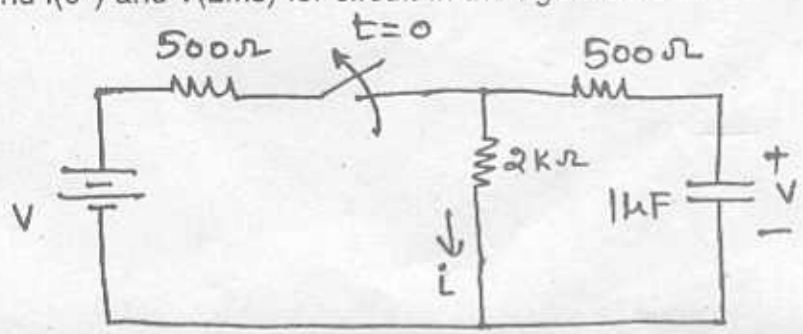
(d) Find Thevenin's equivalent voltage across a and b.



2. (a) Use Superposition to find the value of V_x in the circuit shown. 10



(b) Find $i(0^+)$ and V(2ms) for circuit in the figure below : 10

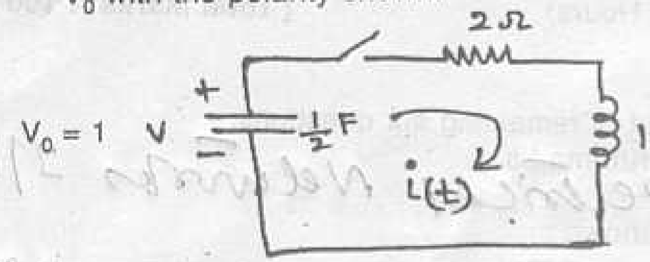


[TURN OVER

www.campuskeeda.com

Con. 2641-VR-3267-09.

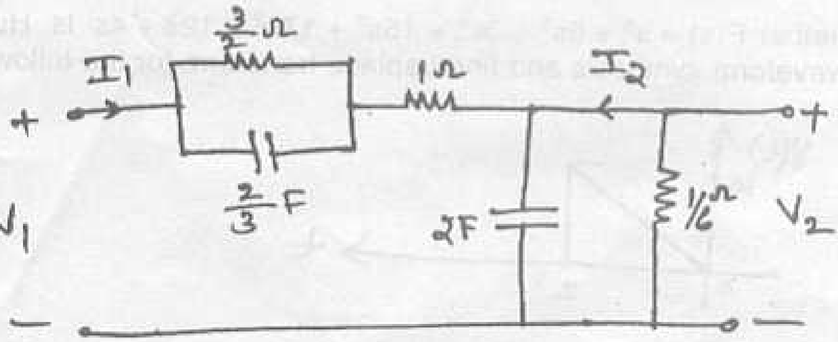
3. (a) Find i(t) using Laplace Transform. Given that capacitor is initially charged to V_0 with the polarity shown. 10



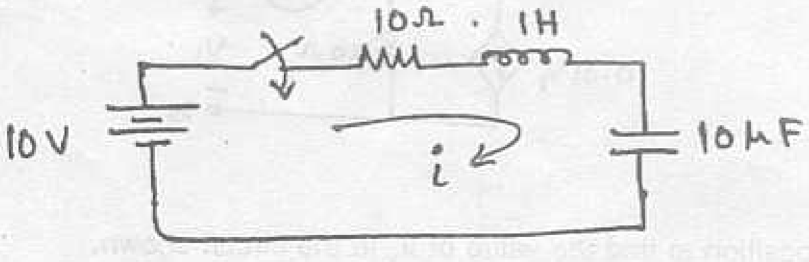
(b) Define step, ramp, impulse functions and find their Laplace Transforms. 10

4. (a) Draw pole-zero plot of $I(s) = \dfrac{5s}{(s+1)(s+3)}$ and find the time domain response. 8

(b) Find V_2/V_1 and V_1/I_2. 12



5. (a) Find $i\,(0^+)$, $\dfrac{di}{dt}(0^+)$, $\dfrac{d^2i}{dt^2}(0^+)$, for the circuit shown. $V_C(0) = 0$. 10

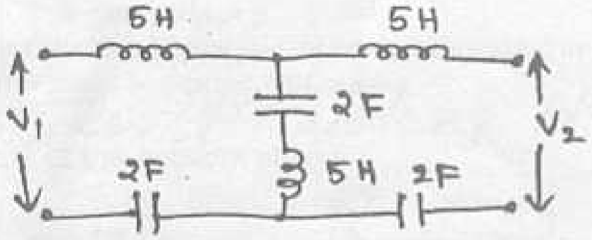


(b) Realize the Foster form of the following function 10

$$Z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$$

Page ③. S.E(E) III Rev Electrical Networks 3/6/09

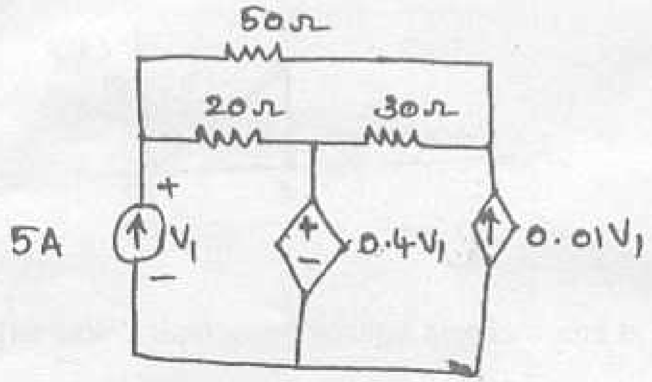
6. (a) Find Z-parameters 10



(b) Test whether following functions are Positive real. 10

(i) $\dfrac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$ (ii) $\dfrac{s^3 + 5s^2 + 9s + 3}{s^3 + 4s^2 + 7s + 9}$

7. (a) Use nodal analysis to determine V_1. 10



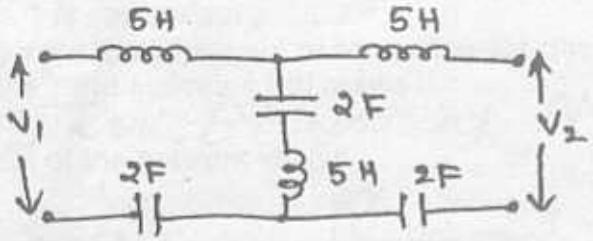
(b) Write short notes on any **two** :— 10

(a) Z- parameters in terms of y parameters
(b) Tellegen's and Millman's theorem.
(c) Properties of RC function
(d) Cut set matrix.

Con. 2641-VR-3267-09.

S.E.(E) III Rev Electrical Networks 3/6/09

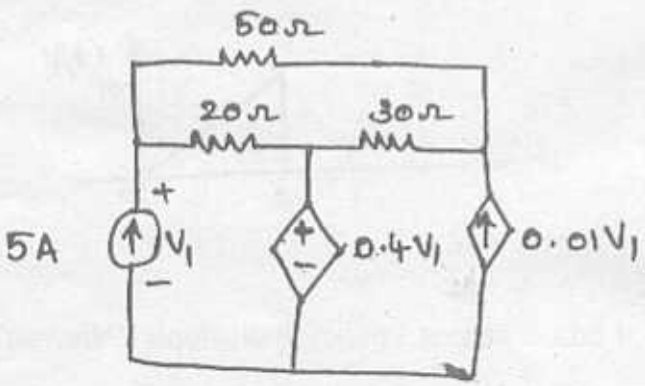
6. (a) Find Z-parameters 10



(b) Test whether following functions are Positive real. 10

(i) $\frac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$ (ii) $\frac{s^3 + 5s^2 + 9s + 3}{s^3 + 4s^2 + 7s + 9}$

7. (a) Use nodal analysis to determine V_1. 10



(b) Write short notes on any **two** :— 10

(a) Z- parameters in terms of y parameters
(b) Tellegen's and Millman's theorem.
(c) Properties of RC function
(d) Cut set matrix.

www.campuskeeda.com

V-Ex-I-09-E-Scan-89

SE (Elect) Sem IV (R) 16/5/2009
Subject. Elect Inst & Instru

Con. 2850-09. **VR-3723**

(REVISED COURSE)

(3 Hours) **[Total Marks : 100**

Lab

N.B. : (1) Question No. **1** is **Compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks

MASTER

1. Solve any **four** of the following :—
   (a) Draw front Panel Layout of CRO. Explain in brief implementation of Controls. 5
   (b) What are requirements of good laboratory type Signal generator ? 5
   (c) What is Thermistor ? Explain Construction and write applications of it. 5
   (d) Write General specifications of Digital Voltmeter. 5
   (e) What is Q of the circuit ? Discuss principle of operation of Q-meter. 5
   (f) Explain with block diagram, structure of PLC. 5

2. (a) Explain digital phase meter. Draw waveforms at various points. 10
   (b) Discuss impedance measurement using Q-Meter. 10

3. (a) Explain construction and working of RTD. Compare RTD and Thermocouple. 10
   (b) Explain with block diagram Generalized Data acquisition System. 10

4. (a) Starting from first principles prove that the gauge factor of wire is $G = 1+2\gamma$. 10
   (b) What are important features of instrumentation amplifier? Explain three OPAMP instrumentation amplifier with proper derivation. 10

5. (a) Explain construction and working of LVDT. Hence write advantages and disadvantages of LVDT. 10
   (b) Explain with block diagram General purpose oscilloscope. 10

6. (a) Explain with block diagram, working of function generator. 10
   (b) Differentiate between Dual Trace and Dual beam Oscilloscopes. 10

7. Write short notes on (Any **two**) :— 20
   (a) SCADA
   (b) Digital Energy Meter
   (c) Storage Oscilloscope
   (d) Photo electric transducers.

———S———

www.campuskeeda.com

SE(E) Sem III (OLD)

Numerical Techniques.

Con. 2638–09. (OLD COURSE) VR–3060

(3 Hours) Page (1) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Make **suitable** assumptions if **required** and **justify** the **same**.
(4) Write programs in C/C_{++}.

1. (a) Define Inherent, Truncation and Round-off error and give an example for each. 5

(b) Prove that – 5

(i) $\mu = \frac{1}{2}\left[E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right]$ (ii) $\mu^2 = 1 + \frac{\delta^2}{4}$

(c) Using Picard's method obtain a solution upto the fifth approximation 5
$\frac{dy}{dx} = x + y$ such that $y = 1$ when $x = 0$.

(d) Derive Newton–Raphson formula. 5

2. (a) List the bracketing methods and open methods and find the real of the equation $x^3 - 9x + 1 = 0$ using bisection method correct to three decimal places. 10

(b) Solve the following equations by Gauss – Seidel method. 10
$20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$.

3. (a) From the following table find the number of students who obtained marks less than 45. 10

Marks	30–40	40–50	50–60	60–70
No. of students	31	42	51	35

(b) Using Newton's divided difference formula, find the value of f(9) from the following table. 10

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

4. (a) Write a program for Lagrange's interpolation and using this formula, find the value of y when x = 140 from the following table. 10

x	110	130	160	190
y	10·8	8·1	5·5	4·8

(b) Fit a straight line to the following data by the method of least squares. 10

x	1	2	3	4	5	6	7
y	0·5	2·5	2·0	4·0	3·5	6·0	5·5

[TURN OVER

www.campuskeeda.com

SCED M Old M.Tech. 29/5/09.

5. (a) The velocity of the train which starts from rest is given by the following table, the time being reckoned in minutes from the start and speed in km/hour. 10

Time	3	6	9	12	15	18
Velocity	22	29	31	20	4	0

Estimate approximately the distance covered in 18 minutes by Simpson's $3/8^{th}$ rule.

(b) Solve $\frac{dy}{dx} = x + y$ with $x_0 = 0$, $y_0 = 1$ by Euler's modified formula find the value of y when $x = 0{\cdot}1$ taking $h = 0{\cdot}05$. 10

6. (a) Solve $\frac{dy}{dx} = x^2 + y^2$ with initial conditions $y(1) = 2$ and find y at $x = 1{\cdot}2$, $x = 1{\cdot}4$ by Runge-Kutta Method of Fourth Order taking $h = 0{\cdot}2$. 10

(b) Using the following data, find x for which y is minimum and find this value of y. 10

x	0·60	0·65	0·70	0·75
y	0·6221	0·6155	0·6138	0·6170

7. (a) The current i in the electric circuit is given by $i = 10e^{-t} \sin 2\pi t$ where t is in seconds. Using Newton's method, find the value of t correct to 3 decimal places for i = 2 amp. 10

(b) Write a program Simpson's $1/3^{rd}$ rule. 5

(c) Write a short note on Golden section search. 5

SE (Elect) sem III (old)
Basic Electronics

Con. 2756-09. VR-3048

(OLD COURSE)

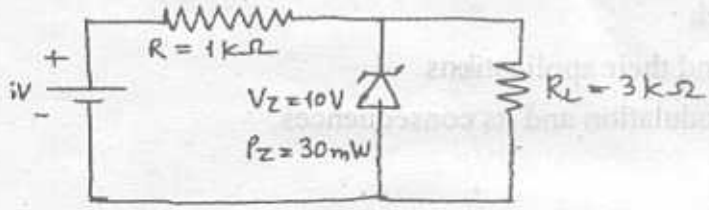
(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**. Solve any **four** questions out of remaining **six** questions.
(2) Assume **suitable data** wherever **required**.
(3) **Figures** to the **right** indicate **full marks**.

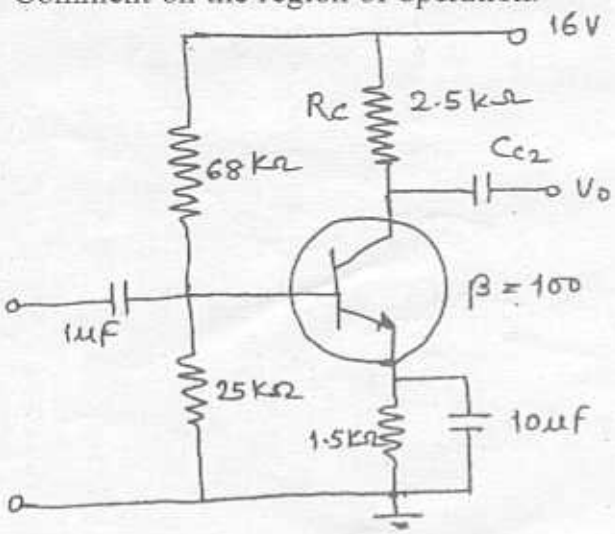
1. (a) Define the terms of FET :— 6
   (i) Pinch-off voltage
   (ii) Trans-conductance
   (iii) Drain resistance.
   (b) Differentiate between BJT and FET. 4
   (c) Differentiate between Series Voltage Regulator and Shunt Voltage Regulator. 6
   (d) Explain the construction of a Solar cell. 4

2. (a) Draw circuit diagram of full wave rectifier with CLC filter. Explain its working with neat sketches. Derive relation for ripple factor. 10
   (b) Define polarization and explain the different types of polarizations in dielectrics. 10

3. (a) For the zener diode circuit shown below, determine V_L, V_R and P_z. 5



   (b) Compare Fixed bias with collector to base bias in case of BJT. 5
   (c) In the circuit shown in **figure**, determine the co-ordinates of operating point of the transistor. Draw the DC load line on output characteristics and show the location of Q point. Comment on the region of operation. 10



[TURN OVER

4. (a) Give the methods used for biasing the JFET with operating points. 8

   (b) Explain the procedure for designing a single stage CS amplifier for audio frequency range using zero temperature drift. 12

5. Design a single stage R-C coupled CE amplifier using the transistor BC147A to meet the following :— 20

   $|Av| \geq 180$, $V_0 = 3V$, $S_{ICO} \leq 10$, $f_L = 20$ Hz, $V_{CC} = 18$ V.

   Given : Data for BC 147A :—

   $IC_{max} = 0{\cdot}1$ Amp, $Pd_{max} = 0{\cdot}25$ W, $h_{FE}(TYP) = 180$,

   $h_{fe}(typ) = 220$, $h_{ie} = 2{\cdot}7$ kΩ.

   Calculate Ri, Ro and Av of the designed circuit.

6. (a) Draw a circuit diagram of the full dual clipper circuit to have clipping levels of ± 5V. Explain its operation with the help of appropriate waveforms and transfer characteristics. 10

   (b) Explain the Hall effect and derive the expression for Hall coefficient. 10

7. Write notes on following :— 20

   (a) Types of capacitors

   (b) BJT as a switch

   (c) Thermistors and their applications

   (d) Base width modulation and its consequences.

———S———

www.campuskeeda.com

I sthalf-09-nkD 234

S.E(E) Sem III (O)

Digital Electronics

Library

Con. 2716-09. VR-3054

(OLD COURSE)

20/5/09

(3 Hours) Page (1) [Total Marks : 100

MASTER

N.B.: (1) Question No. **1** is **compulsory**.
(2) Solve any **four** out of remaining **six** questions.
(3) Assumptions made should be **clearly** stated.
(4) **Figures** to the **right** indicate marks.

1. (a) Add the Octal numbers $(341)_8$, $(125)_8$, $(472)_8$ and $(577)_8$. 4
   (b) Convert 0·8125 decimal numbers to its binary equivalent. 4
   (c) Multiply $(1110)_2$ and $(1010)_2$ using binary multiplication method. 4
   (d) Prove De-Morgan's Theorems. 4
   (e) Implement OR Gate using NAND Gates only. 4

2. (a) Prove that— 10
   (i) $\overline{A}BC\overline{D} + BC\overline{D} + B\overline{C}\,\overline{D} + B\overline{C}D = B(\overline{D}+\overline{C})$
   (ii) $\overline{\overline{AB} + \overline{A} + AB} = 0$
   (b) Design BCD to Excess-3 code converter. 10

3. (a) Implement the following function using K-Map (Use NAND Gates only) 10
   $f(w, x, y, z) = \Sigma m\,(1, 4, 5, 6, 11, 12, 13, 14, 15)$
   (b) Using Quine McClusky method minimize the Boolean Expression 10
   $f(A, B, C, D) = \Sigma m\,(1, 5, 6, 12, 13, 14) + d(2, 4)$

4. (a) Explain what is master slave Flip Flop and give its applications. 10
   (b) Draw and explain universal Shift Register with its operation. 10

5. (a) Design of a synchronous Mod-6 counter using clocked JK Flip Flops. 10
   (b) Give difference between Synchronous counter and Asynchronous counter. 10
   Give Merits and Demerits of these counters.

6. (a) Implement the following function using 4:1 multiplexer. 10
   $f(A, B, C) = \Sigma m\,(1, 3, 5, 6)$
   (b) Write short notes on : 10
   (i) Fan out, Fan in.
   (ii) Propagation Delay.

7. (a) Draw TTL NAND Gate and explain its working. 10
   (b) Short notes on : 10
   (i) Arithmetic and Logic Unit
   (ii) Carry Look ahead Adder.

www.campuskeeda.com

SE(E) III (R)
NUMERICAL TECHNIQUES

Con. 2640–09. (REVISED COURSE) VR–3273

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Make **suitable** assumptions if **required** and **justify** the **same**.
(4) Write programs in C/C++.

1. (a) Find absolute, relative and percentage error in following numbers. Determine number of significant digits : 5

(i) $a = 123{\cdot}41769543$ $\bar{a} = 123{\cdot}41$

(ii) $b = 0{\cdot}0053102500$ $\bar{b} = 0{\cdot}0051$

(iii) $c = 450550$ $\bar{c} = 450552.$

(b) Define the operators Δ, ∇, δ, μ and E. Prove that – 5

(i) $2\mu\delta = \Delta + \nabla$ (ii) $E = 1 + \Delta$.

(c) Using Picard's method solve 5

$$\frac{dy}{dx} = 1 + xy \text{ such that } y = 0 \text{ when } x = 0.$$

(d) Derive the equation for Regula–falsi method using geometrical interpretation. 5

2. (a) List the bracketing methods and open methods and find the real root of the equation $x \sin x + \cos x = 0$ using Newton–Raphson method correct to three decimal places. 10

(b) Solve the following equations by Gauss–Seidel method. 10

$27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$.

3. (a) From the following table find the number of students who obtained marks less than 45. 10

Marks	30–40	40–50	50–60	60–70
No. of students	31	42	51	35

(b) Using Newton's divided difference formula, find the value of f(9) from the following table. 10

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

4. (a) Write a program for Lagrange's interpolation method and using this formula, find the value of y when x = 10 from the following table. 10

x	5	6	9	11
y	12	13	14	16

(b) The result of measurement of electric resistance R of a copper bar at various temperatures t°C are listed below : 10

t	19	25	30	36	40	45	50
R	76	77	79	80	82	83	85

Find a relation $R = a + bt$

[TURN OVER

S.E (C) III Rev Num. Techniques 29/5/09

5. (a) The velocity of the train which starts from rest is given by the following table, the time being reckoned in minutes from the start and speed in km/hour. 10

Time	3	6	9	12	15	18
Velocity	22	29	31	20	4	0

Estimate approximately the distance covered in 18 minutes by Simpson's $3/8^{th}$ rule.

(b) Solve $\frac{dy}{dx} = x + y^2$ with $x_0 = 0$, $y_0 = 1$ by Euler's modified formula find the value of y when $x = 0{\cdot}5$ taking $h = 0{\cdot}25$. 10

6. (a) Solve $\frac{dy}{dx} = x + y$ with initial conditions $y(1) = 2$ and find y at $x = 1{\cdot}2$, $x = 1{\cdot}4$ by Runge-Kutta Method of Fourth Order taking $h = 0{\cdot}2$. 10

(b) Write a algorithm and c/c++ program for Gauss Elimination method and also solve the following set of equations using Gauss Elimination method. 10

$2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$.

7. (a) Explain the propagation of errors. 5

(b) Derive Newton Cotes integration formula and also write a program Simpson's $1/3^{rd}$ rule. 10

(c) Write a short note on Golden section search. 5

---

www.campuskeeda.com

SE Sem II (Elect) (Rev)
Basic Electronics.

LAB 5/5/09

68% : G-m

Con. 2519-09.

(REVISED COURSE)

VR-3264

Page (1)

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

MASTER

1. (a) Explain the operation of Zanier diode in the forward and reverse biased condition and draw its characteristics. 10
   (b) A 100 μf capacitor when used as a filter has 12 V dc across it with a terminal load resistor of 2.5 k ohm. If the rectifier is full wave and supply frequency is 50 Hz what is the percentage of ripple in the output ? 10

2. (a) Write a notes on :— 10
      (i) Thermal stabilization
      (ii) Compensation.
   (b) Explain the working of a CE BJT voltage amplifier. 10

3. (a) Draw the h-parameter model of a transistor CE amplifier and derive equation for Av, Ri, Ro and Ai. 10
   (b) Explain the effects of negative feedback on following :— 10
      (i) Input impedance
      (ii) Voltage gain
      (iii) Output impedance
      (iv) Current gain.

4. (a) Explain the construction, characteristics and working of a typical JFET used for the voltage amplification. 10
   (b) Explain the working of biasing circuit of JFET amplifier with resistive load which will give stabilization of operating quiescent point against device variation. What will be the input impedance and output impedance for the amplifier ? 10

5. (a) Explain the operation of a photo transistor with the help of suitable diagram. 10
   (b) An amplifier with negative feedback gives an output of 12.5 V with an input of 1.5 V, when feedback is removed, it requires 0.25 V input for the same output. Find — 10
      (i) Value of voltage gain without feedback
      (ii) Value of β if the input and output are in phase and β is real.

6. (a) Explain the AC analysis of dual input balanced output differential amplifier. 10
   (b) Write a short notes on :— 10
      (i) LED (iii) Solar sell
      (ii) Photodiode (iv) Optoisolators.

7. (a) Explain the voltage doublers circuit with the help of suitable circuit diagram and waveform. 10
   (b) Write a short notes on any **two** :— 10
      (i) Schottkey diode
      (ii) Varactor diode
      (iii) PIN diode.

(3 Hours)

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of **remaining** questions.
(3) Draw a **neat** diagram if **required**.
(4) Answer to question should be grouped and written **together**.

1. (a) Define : (i) Demand factor (ii) Load factor (iii) Diversity factor (iv) Utilization factor (v) plant capacity factor. 5
(b) Explain in brief : (i) hydrologic cycle (ii) runoff (iii) Hydrograph. 5
(c) Explain : (i) Radioactive Decay (ii) Activity (iii) Half life (iv) Average (mean) life. Nuclear fission and fusion. 5
(d) Draw a neat layout of fuel handling equipment in steam powerplant and explain its operation in brief. 5

2. (a) Explain various types of tarrif in brief. 10
(b) Two part tariff rate is quoted as below — 10

Demand rate :
First 1 kw of maximum demand = Rs. 6/kw/month
Next 4 kw of maximum demand = Rs. 5/kw/month
Excess 5 kw of maximum demand = Rs. 4/kw/month.

Energy rates :
First 50 kwh = 7 paise/kwh
Next 50 kwh = 5 paise/kwh
Next 200 kwh = 4 paise/kwh
Next 400 kwh = 3 paise/kwh
Excess over 700 kwh = 2 paise/kwh.

Determine :
(i) monthly bill for a total consumption of 2000 kwh and a m.d. of 15 kw. Also find out the unit energy cost.
(ii) lowest possible bill for a month and a corresponding unit energy cost.

3. (a) Explain in brief classification of Hydro electric powerplant. 10
(b) Explain in brief Nuclear reactors. 10

4. (a) Explain (i) Fluidized bed combustion process (ii) Pulverised fuel firing. 10
(b) List advantages and disadvantages of Gas turbine power plant over Diesel power plant and Steam power plant. 10

5. (a) A power station has the installed capacity of 180 Mw Cal. cost of generation. 10
Other data pertaining to power station are given below :
Capital Cost = Rs. 300×10^6
Rate of interest and depreciation = 18 percent
Annual cost of fuel oil, salaries and Taxation = Rs. 36×10^6
Load factor = 0·4
Also calculate the saving in cost/kwh if annual load factor is raised to 0·5, (Assume M.D. = Capacity of power plant).
(b) Explain ASh handling plant in steam power station. 10

6. (a) Explain the operation of Diesel power plant and also explain the essential component of Diesel power plant. 10
(b) Explain in brief factors affecting Economic of generation and Distribution of Electric power. 10

7. Write notes on any two :– 20
(a) Gas turbine power plant
(b) Solar power plant
(c) Green house effect
(d) Acid rain and acid snow.

www.campuskeeda.com