

Total No. of Printed Pages:04

SUBJECT CODE NO:- H-111
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (All Branches)
Engineering Mathematics - IV
(REVISED)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

1. Q. No. 1 and 6 are compulsory
2. Solve any two questions from the remaining questions of each section
3. Figures to the right indicate full marks
4. Assume suitable data, if necessary

Section: A

Q.1 Attempt any five

10

1. If $L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}$ then find $L\{J_0(3t)\}$
2. Find Laplace transform of $\cos t \log t \delta(t - \pi)$
3. Find inverse Laplace transform of $\frac{e^{-3s}}{s^2-1}$
4. Find inverse Laplace transform of $\frac{1}{s^2-2s+17}$
5. Find inverse z-transform of $\frac{z}{(z-1)(z-2)}$ by residue method

ORSolve by direct integration method $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$

6. Find z-transform of $\sinh \frac{\pi}{2} k, k \geq 0$

OR

Form a partial differential equation by eliminating a and b from the equation

$$z = (x + a)(y + b)$$

7. Find z-transform of $f(k) = 3^k k, k \geq 0$

ORSolve $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = u, u(0, y) = 3e^{-3y}$

8. Find z-transform of $f(k) = \cos 2k, k \geq 0$

OR

Solve $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial y}$, where $u(x, 0) = 6e^{-3x}$

- Q.2 a. Find Z- transform of $3^k \sin(2k + 5)$ 05

OR

Solve $y^2 zp + x^2 zq = y^2 x$ by Lagrange's method of linear partial differential equations

- b. Find Laplace transform of $e^{-3t} \int_0^t t \sin 3t dt$ 05
 c. Find inverse Laplace transform of $\log \left(\frac{s+a}{s+b} \right)$ 05

- Q.3 a. Find z-transform of $k^2 f(k)$ if $f(k) = 3^k, k \geq 1$ 05

OR

Solve $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6 e^{-3x}$

- b. Find Laplace transform of $f(t) \begin{cases} t, 0 < t < 1 \\ 2 - t, 1 < t < 2 \text{ and} \\ f(t) = f(t + 2) \end{cases}$ 05
 c. Find inverse Laplace transform of $\frac{1}{(s^2+1)(s^2+4)}$ by using convolution theorem 05

- Q.4 a. Find inverse z- transform of $\frac{z}{(z-2)(z-3)}$ by partial fraction 05

OR

Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with boundary conditions

$u(x, 0) = 3 \sin n\pi x, u(0, t) = 0$
 and $u(1, t) = 0$, where $0 < x < 1, t > 0$

- b. Evaluate $\int_0^\infty e^{-2t} \sin^3 t dt$ 05
 c. Solve $y'' - 4y' + 3y = 6t - 8, y(0) = 0$
 $y'(0) = 0$ by Laplace transform 05

- Q.5 a. Solve the difference equation by z-transform
 $y(k + 2) - 4y(k) = 0$, given
 That $y(0) = 0, y(1) = 2$

05

OR

Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to conditions

$u(0, y) = 0, \quad u(\pi, y) = 0,$

$u(x, 0) = 100 \quad \text{and} \quad u(x, \infty) = 0$

- b. Express the given function into Heaviside unit step function and hence find its Laplace transform

05

$f(t) = t^2, \quad 0 < t < 1$
 $= 4t, \quad t > 1$

- c. Find inverse Laplace transform of $\frac{s e^{-3s}}{s^2 + 8s + 25}$

05

Section: B

- Q.6 Attempt any five

10

- a. Find $f(2)$ for the data

x:	0	1	4
f(x)	4	3	24

- b. Find the first approximate value of the root (i.e. x_1) by Newton raphson method for $\log x = \cos x$

- c. Find the values of x, y, z in the first iteration by Gauss seidal method

$10x + 2y + z = 69$

$x + 8y + 2z = -3$

$2x - y + 20z = 76$

- d. Find the values of k_1 and k_2 while solving the D.E.

$\frac{\partial y}{\partial x} = 3e^x + 2y, \quad y(0) = 0, \quad \text{Take } h = 0.1 \text{ by runge-kutta fourth order method}$

- e. Verify whether $f(z) = \sin z$ is analytic

- f. Find the image of $|z| = 2$ under $w = \frac{1}{z}$

- g. Evaluate $\int_c (x + y)dx + (2y - x)dy$ where c is the straight line $y=x$ joining the points $(0,0)$ to $(3,3)$

h. Find the residues of $\frac{z}{(z+3)(z-2)}$ at each of its poles

Q.7 a. Fit a second degree parabola to the following data 05

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

b. Apply the Runge-Kutta fourth order method to find $y(1.1)$ given that, 05

$$\frac{dy}{dx} = 3x + y^2, \quad Y(1) = 1.2, \quad h = 0.1$$

c. If $f(z) = u + iv$ is analytic then find $f(z)$ if $u + v = e^x(\cos y + \sin y)$ 05

Q.8 a. Using Lagrange's formula find $f(2)$ from the data 05

x	0	1	4	5
f(x)	4	3	24	39

b. Evaluate $\int_c \frac{e^{-z}}{(z+2)^3} dz$, where c is the circle $|z| = 3$, by Cauchy's integral formula 05

c. Show that $u = \log \sqrt{x^2 + y^2}$ is harmonic hence find harmonic conjugate 05

Q.9 a. Find the root of the equation $2(x - 3) = \log_{10} x$ by Newton Raphson method 05

b. Evaluate $\int_c \frac{dz}{\sinh z}$, where c is $|z| = 4$ by Cauchy's residue theorem 05

c. Find the bilinear transformation which maps the points $z=1, i, -1$ into the points $w=i, 0, -i$ 05

Q.10 a. Expand $f(z) = \frac{1}{z^2 - 4z + 3}$ by Laurent series for $1 < |z| < 3$ 05

b. Solve by using Gauss-Seidel method 05

$$\begin{aligned} 10x + 2y + z &= 9 \\ 2x + 20y - 2z &= -44 \\ -2x + 3y + 10z &= 22 \end{aligned}$$

c. Evaluate $\int_{(0,0)}^{(1,1)} (3x^2 + 4xy + ix^2) dz$ along $y=x$ 05

Total No. of Printed Pages:04

SUBJECT CODE NO:- H-112
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (All Branches)
Engineering Mathematics –IV
(OLD)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q.No.1 and 6 are compulsory.
 - ii. Solve any two questions from remaining of each section.
 - iii. Figures to the right indicate full marks.
 - iv. Assume suitable data, if necessary.

SECTION-A

Q.1 Solve any five from the following 10

- a) Determine the analytic function whose real part is $2x(1 - y)$.
- b) Show that $u = r^n \cos n\theta$ is harmonic.
- c) Show that the image of the line $x = 0$ under the transformation $w = e^z$ is a circle.
- d) Evaluate $\int_0^{1+i} z^2 dz$ along the line $y = x$.
- e) Evaluate $\int_c \frac{e^z}{(z-1)^2} dz$ where $c : |z| = 2$.
- f) State Cauchy's residue theorem.
- g) Solve $\frac{\partial z}{\partial x} + 4z = \frac{\partial z}{\partial t}$, where $z(x, 0) = 4e^{-3x}$

OR

Find Z-transform of $f(k) = a^k$.

- h) Solve $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$

OR

Find Z-transform of $f(k) = \cos 2k$.

Q.2 a) Determine analytic function $f(z) = u + iv$ whose imaginary part is $e^{-x}(x \sin y - y \cos y)$. 05

- b) Show that $w = \frac{i-z}{i+z}$ maps the real axis of z-plane into the circle $|w| = 1$ and the half plane $y > 0$ into the interior of the unit circle $|w| = 1$ in the w-plane. 05

- c) Solve $\frac{\partial u}{\partial t} = \beta^2 \frac{\partial^2 u}{\partial x^2}$ subject to the conditions 05
- i. $u(0, t) = u(l, t) = 0$ for all t
 - ii. $u(x, 0) = x$ in $0 < x < l$
 - iii. $u(x, \infty)$ is finite.

OR

Find Z-transform of $3^k \sin(3k - 2)$.

- Q.3
- Show that $v = r^2 \sin 2\theta + r \sin \theta$ is harmonic. Find its harmonic conjugate and hence find corresponding analytic function. 05
 - Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along $x = t + 1; y = 2t^2 - 1$ 05
 - Solve $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$ subject to the conditions 05
 - $u(0, t) = u(l, t) = 0$ for all t .
 - $\frac{\partial u}{\partial t} = 0$ when $t = 0$
 - $u(x, 0) = a \sin \frac{\pi x}{l}$

OR

Find inverse z-transform of $\frac{z}{(z^2+7z+10)}$

- Q.4
- Expand $f(z) = \frac{1}{(z^2-3z+2)}$ for $1 < |z| < 2$ 05
 - Evaluate $\oint_c \frac{\cos z}{(z-\pi)^3} dz$ where c is $|z - 1| = 3$ 05
 - Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ 05
 Subject to the conditions
 - $u = 0$ when $y \rightarrow \infty$ for all x
 - $u = 0$ when $x = 0$ for all y
 - $u = 0$ when $x = 1$ for all y
 - $u = x(1 - x)$ when $y = 0$ for $0 < x < 1$

OR

Solve the difference equation by z-transform

$$u_{k+2} + 4u_{k+1} + 3u_k = 3^k \text{ with } u_0 = 0, u_1 = 1$$

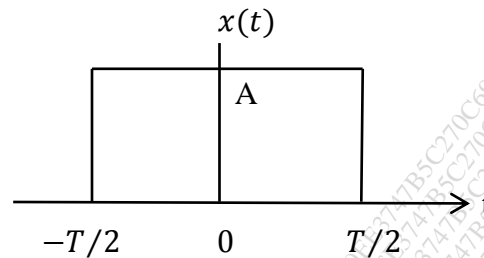
- Q.5
- Find the bilinear transformation which maps the point $z = 1, i, -1$ into the points $w = i, 0, -i$. 05
 - Evaluate $\oint_c \frac{z \sec z}{(1-z)^2} dz$ where c is the circle $|z| = 2$ by residue theorem 05
 - Evaluate $\int_0^{2\pi} \frac{d\theta}{1-2a \sin \theta + a^2}, 0 < a < 1$. 05

SECTION B

- Q.6 Solve any five from the following. 10
- a) Define Laplace Transform and find $L\{e^t\}$.
 - b) Find Laplace Transform of $\sin^2 2t$.
 - c) Find Laplace Transform of $f(t) = e^{t-2}, t > 2$
 $= 0, t < 2$
 - d) Find inverse Laplace transform of $\frac{2s+1}{s(s+1)}$
 - e) Find inverse Laplace transform of $\frac{e^{-\pi s}}{s^2+4}$
 - f) Find inverse Laplace transform of $\frac{s}{(s-3)^5}$
 - g) Find the Fourier sine transform of $\frac{1}{x}$
 - h) Find the Fourier sine transform of $f(x) = 1, |x| < a$
 $= 0, |x| > a$
- Q.7
- a) Find Laplace Transform of $e^{3t} \int_0^t t \cosh 3t dt$ 05
 - b) Find inverse Laplace transform of $\log \left[\frac{s+3}{s+2} \right]$ 05
 - c) Solve $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}, -\infty < x < \infty$ 05
 Subject to the conditions
 - i. u and $\frac{\partial u}{\partial x} \rightarrow 0$ as $x \rightarrow \pm\infty$
 - ii. $u(x, 0) = \begin{cases} u_0 & |x| \leq a \\ 0 & |x| \geq a \end{cases}$
- Q.8
- a) Evaluate $\int_0^\infty e^{-3t} \sin^3 t dt$ 05
 - b) Find inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$ by convolution theorem. 05
 - c) Solve the integral equation $\int_0^\infty f(x) \cos px dx = \begin{cases} 1-p; & 0 < p < 1 \\ 0; & p > 1 \end{cases}$ 05

- Q.9
- a) Find the Laplace Transform of $f(t) = \begin{cases} 1 & ; 0 \leq t \leq 2 \\ -1 & ; 2 \leq t \leq 4 \end{cases}$ where $f(t+4) = f(t)$ 05
- b) Solve $\frac{dy}{dt} + 3y + 2 \int_0^t y dt = t, y(0) = 0$ by Laplace Transform. 05
- c) Find Fourier sine transform of $f(x) = e^{-x}$ and evaluate $\int_0^{\infty} \frac{x \sin kx}{1+x^2} dx$ 05
- Q.10
- a) Express the following function in term of Heaviside unit step function and hence find Laplace Transform $f(t) = \begin{cases} t^2 & ; 0 < t < 1 \\ 4t & ; t > 1 \end{cases}$ 05
- b) Solve by Laplace Transform $\frac{dx}{dt} - y = e^t; \frac{dy}{dt} + x = \sin t$, subject to $x(0) = 1; y(0) = 0$. 05
- c) Find Fourier sine Transform of $f(x) = \frac{e^{-ax}}{x}$ 05

- Q.4 a) Obtain the Fourier transform of a rectangular pulse of duration T and amplitude A as shown in fig. 08



- b) Describe the following types of Fourier series 07
- 1) Trigonometric or quadrature Fourier series
 - 2) Polar Fourier series
 - 3) Exponential Fourier series

- Q.5 Write short notes on (any three) 15
- a) Impulse response of LTI system
 - b) Operations of signals
 - c) Properties of Fourier transform
 - d) Explain intergro-differential equation

Section B

- Q.6 Attempt any five questions 10
- a) What are the rules to decide ROC
 - b) State & prove differentiation property of LT
 - c) Define Laplace transform & what is the 'S' Domain?
 - d) Give analogy between autocorrelation and convolution
 - e) Determine the ESD of the signal $x(t) = \sin c(t)$
 - f) What is instantaneous & average normalized power?
 - g) State sampling theorem

- Q.7 a) Using shifting property find Laplace Transform of $\sin wt$ and $\cos wt$ 08
- b) Calculate Laplace transform of $x(t) = e^{-2t}u(t) - e^{2t}u(-t)$ and plot the ROC. 07

- Q.8 a) State the properties of autocorrelation and sketch the autocorrelation of sine bursts 08
- b) Plot the correlogram between the sequences $x(n) = e^{-n}u(n)$ and $y(n) = n.u(n)$ 07

- Q.9 a) State and explain the properties of ESD in detail. 08
- b) Obtain spectral density, autocorrelation and signal energy when $v(t) = A \text{ sinc}[4\omega(t + td)]$ 07

Q.10

Write short notes on (any three)

- Interrelation between autocorrelation and PSD
- Application of Laplace transform to the LTI system
- Covariance and Convolution
- Properties of cross-correlation

15

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-171
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Digital Logic Design
(OLD)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Question no.1 from Section A and Question no.6 from Section B, are compulsory.
 2. Attempt any two questions from the remaining questions, in each section.
 3. Figures to the right indicate full marks.
 4. Assume suitable data wherever necessary.

Section A

- | | | |
|-----|---|----------|
| Q.1 | Solve any five: | 10 |
| | <ol style="list-style-type: none"> (a) Enlist the characteristics of digital ICs (b) What is Tri-State logic? Explain (c) Define encoder and decoder. (d) Explain half subtractor. (e) Convert the gray code '1011' to binary (f) What do you mean by don't care condition? (g) What is HDL? Explain. (h) Briefly explain the role of digital comparator. | |
| Q.2 | <ol style="list-style-type: none"> (a) Design 32:1 multiplexer using 4:1 multiplexers. (b) Minimize the following logic expression using k-map and implement the reduced expression using NOR gates.
 $F(A, B, C, D) = \pi m(2, 7, 8, 9, 10, 12)$ | 08
07 |
| Q.3 | <ol style="list-style-type: none"> (a) Design 2-bit digital comparator (b) Minimize the following expression using Quine Mccluskey method.
 $f(A, B, C, D) = \Sigma m(0, 2, 6, 7, 8, 10, 11, 12, 13) + d(3, 4, 14)$ | 07
08 |
| Q.4 | <ol style="list-style-type: none"> (a) State the advantages of ECL logic family over other logic families. (b) Explain TTL logic in detail | 08
07 |
| Q.5 | Write short notes on any three of the following: <ol style="list-style-type: none"> (a) Parallel adder IC 7483 (b) NMOS logic family (c) K-map representation (d) PAL (e) Parity Generators and checkers. | 15 |

Section B

- Q.6 Solve any five: 10
- (a) What is ADC? Explain in brief
 - (b) Enlist the types of shift register
 - (c) Compare asynchronous and synchronous counter
 - (d) How does D flip-flop operate?
 - (e) Explain preset and clear terminal of a flip – flop.
 - (f) State the advantages of successive approximation A/D converter.
 - (g) What is the difference between RAM & ROM.
 - (h) Define “Clock”. Explain its necessity in digital circuits.
- Q.7 (a) Perform the following conversions: 08
- (i) T to JK
 - (ii) JK to SR
- (b) Explain the working of universal shift register. 07
- Q.8 (a) Explain the applications of ADC and DAC. 08
- (b) Design a 4-bit synchronous counter counting from 0 to 15. Specify the IC required. 07
- Q.9 (a) Compare EPROM and EEPROM. 08
- (b) Explain master slave J-K flip-flop. 07
- Q.10 Write short notes on any three of the following 15
- (a) Mealy machines
 - (b) Memory organization
 - (c) Ring counter
 - (d) Sequence generator and detection
 - (e) SRAM and DRAM

Total No. of Printed Pages:04

SUBJECT CODE NO: H-301
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (All Branches)
Engineering Mathematics - III
(OLD)

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i) Questions number 1 and 6 are compulsory.
- ii) Attempt any two questions from the remaining each section.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data if necessary.

SECTION – A

Q.1 Solve any five from the following:

10

- a) Solve $(D^2 - 6D + 25)y = 0$
- b) Solve $(D^2 - 4D + 5)y = 0$
- c) Find the particular integral of $(D^2 - 4)y = x^2$
- d) Solve $(x^2D^2 + xD - 1)y = 0$
- e) If 2lb weight is pulled 6 inches below its equilibrium position and then released. Assuming a spring constant $k = 16lb/ft$, damping force $2 \frac{dx}{dt}$ Set- up the equation of motion.
- f) A circuit consists of an inductance of 0.05 henry, a resistance of 5 ohms and a Condenser of capacitance 4×10^{-4} farad, with constant EMF of 110 volts. Set-up the differential equation.
- g) In a certain manufacturing process 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools, at most 2 will be defective.
- h) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Find the number of students whose marks will be less than 68.

- Q.2 a) Solve $(D^2 - 6D + 13)y = 8e^{3x} \sin 4x$ 05
- b) If a weight 6lb hangs from a spring with constant $k = 12$ and no damping force exists. Find the motion of weight when an external force $3\cos 18t$ acts. Initially $x = 0, \frac{dx}{dt} = 0$ at $t = 0$. Determine whether the resonance occurs. 05
- c) Calculate the mean deviation from mean of the following data: 05

x	0-6	6-12	12-18	18-24	24-30
f	8	10	12	9	5

- Q.3 a) Solve $(D^3 - 2D + 4)y = 3x^2 - 5x + 2$ 05
- b) A one henry inductance, a 4 microfarad capacitor and EMF of $180 \cos 40t$ are connected in series. Find the charge Q and the current i, if $i = Q = 0$ at $t = 0$. 05
- c) Suppose that life of a gas cylinder is normally distributed with mean of 40 days and a standard deviation of 5 days. If at a time 10,000 cylinders are issued to customer's, how many will need replacement after 35 days? 05

- Q.4 a) Solve $(D^2 + 5D + 6)y = e^{e^x}$ by using general method. 05
- b) A long column of length l fixed at one end is completely free at other. If the load P is axially applied at the free end. Its deflection is given by 05

$$EI \frac{d^2y}{dx^2} = P(a - y)$$

Where the origin is taken at the fixed end and 'a' is the lateral displacement of the free end. Show that the deflection curve is given by

$$y = a \left[1 - \cos \left(\sqrt{\frac{P}{EI}} x \right) \right]$$

- c) Compute mean, variance, β_1 and β_2 if the first four moments about a value 5 of a variable are given as 2, 20, 38 and 52. 05
- Q.5 a) Solve $(D^2 + 4)y = \frac{1}{1 + \cos 2x}$ by using method of variation of parameter. 05
- b) Solve $(x - 1)^3 \frac{d^3y}{dx^3} + 2(x - 1)^2 \frac{d^2y}{dx^2} - 4(x - 1) \frac{dy}{dx} + y = 4 \log(x - 1)$ 05

- c) Fit a straight line to the following data:

05

x	1	2	3	4
y	3	7	13	21

SECTION – B

Q.6 Solve any five from the following:

10

- a) If $\vec{F} = x \cos z i + y \log x j - z^2 k$ find $\text{curl } \vec{F}$
- b) Find the unit vector normal to the surface $xy^3z^2 = 4$ at the point $(-1, -1, 2)$
- c) Find the constant 'a' if $\vec{F} = (x + 3y^2)i + (2y + 2z^2)j + (x^2 + az)k$ is solenoidal.
- d) Evaluate $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = \cos y i - x \sin y j$ and C is the curve $y = \sqrt{1 - x^2}$ in xy-plane from $(1,0)$ to $(0,1)$
- e) State Stoke's theorem.
- f) Find the first approximate root of the equation $xe^x - \cos x = 0$ using Newton Raphson method.
- g) Find the first approximate solution of the equation

$$\begin{aligned} 8x - 3y + 2z &= 20, \\ 4x + 11y - z &= 33, \\ 2x + y + 4z &= 12 \end{aligned}$$
 by Gauss Seidal method.
- h) Find the missing term in the following:

x	0	1	3	4
f(x)	5	6	--	105

Q.7

- a) Find the directional derivative of $\frac{1}{r}$ in the direction of \vec{r} , where $\vec{r} = xi + yj + zk$ 05
- b) Find the work done in moving a particle in the force field $\vec{F} = 3x^2i + (2xz - y)j + zk$ along the straight line joining the points $(0,0,0)$ and $(2,1,3)$ 05
- c) Find the real root of the equation $x + \log x = 2$ by Newton – Raphson method correct to three decimal places. 05

- Q.8 a) Prove that $\nabla^4 e^r = \left(1 + \frac{4}{r}\right) e^r$ 05
- b) Evaluate Green's theorem for $\int_C (3x + 4y)dx + (2x - 3y)dy$ with $C: x^2 + y^2 = 4$ 05
- c) Given $\frac{dy}{dx} = x^2 - y, y(0) = 1$, find $y(0.1)$ and $y(0.2)$ using Runge – Kutta fourth order method. 05
- Q.9 a) Prove that the vector field $\bar{F} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational. Find the scalar potential ϕ such that $\bar{F} = \nabla\phi$. 05
- b) Evaluate $\iint_S \bar{F} \cdot \bar{d}s$ using Gauss divergence theorem, where $\bar{F} = 2xyi + yz^2j + zxk$ and S is surface of the region bounded by $x = 0, y = 0, z = 0, y = 3, x + 2z = 6$. 05
- c) Solve the equations $83x + 11y - 4z = 95, 7x + 52y + 13z = 104, 3x + 8y + 29z = 71$ by Gauss Seidal method. 05
- Q.10 a) Verify Stoke's theorem for $\bar{F} = 4xzi - y^2j + yzk$ over the area in the plane $z = 0$, bounded by $x = 0, y = 0, x^2 + y^2 = 1$ 05

- b) From the following table, Obtain the first and second derivative at the point $x = 0.96$ 05

x	0.96	0.98	1.00	1.02	1.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

- c) Taking $h = 0.05$, determine the value of y at $x = 0.1$ by Euler's modified method, given that $\frac{dy}{dx} = x^2 + y, y(0) = 1$ 05

Total No. of Printed Pages: 02

SUBJECT CODE NO:- H-277
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Electrical Machines & Instrumentation
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No 1 and Q. No 6 are compulsory .
 - ii) Solve any two question from reaming questions of each section.
 - iii) Figure to the right indicate full marks.

Section A

- | | | |
|-----|---|----|
| Q.1 | Attempt any Five | 10 |
| | <ol style="list-style-type: none"> a) Write two applications of FHP motor b) Why rotor copper bars are not parallel to rotor shaft. c) Draw torque-slip curves for three phase induction motor. d) What is the significance of back EMF. e) Losses occur in D.C motors. f) What is armature reaction ? g) How rotating magnetic field is established? h) DC series motor never to be started on No load conditions why? | |
| Q.2 | <ol style="list-style-type: none"> a) Explain construction of DC machine with neat sketch. | 08 |
| | <ol style="list-style-type: none"> b) Derive EMF equation of DC generator. | 07 |
| Q.3 | <ol style="list-style-type: none"> a) Derive an expression for running torque of 3 ϕ IM . Obtain conditions for maximum starting and running torques. | 08 |
| | <ol style="list-style-type: none"> b) Explain the construction of synchronous motor with neat sketch. | 07 |
| Q.4 | <ol style="list-style-type: none"> a) Explain the construction and working of stepper motor. | 07 |
| | <ol style="list-style-type: none"> b) Explain hysteresis motor in detail. | 08 |
| Q.5 | <ol style="list-style-type: none"> a) Explain different –starters used for poly phase induction motors. | 07 |
| | <ol style="list-style-type: none"> b) Explain effect of excitation on armature current – and power factor | 08 |

Section B

- Q.6 Attempt any Five 10
- a) State four selection criteria's for transducer
 - b) What is thermo couple
 - c) Explain semiconductor strain gauge
 - d) Explain principal of position telemetry system.
 - e) What is RTC
 - f) List property of ESD.
 - g) What are bimetallic Thermometers.
 - h) What is fire detector
- Q.7 a) Explain working of smoke detector 07
- b) With suitable diagram explain working of LVDT. List its applications. 08
- Q.8 a) Explanation of X-Y plotter with neat sketch & state its applications. 07
- b) Explain cold cathode display in detail. 08
- Q.9 a) Explain the working of smoke detector. 07
- b) Explain working of object counter. 08
- Q.10 a) Discuss the need of signal conditioning & their types. 07
- b) Explain interfacing techniques of transducer with microprocessor . 08

Total No. of Printed Pages:03

SUBJECT CODE NO: H-135
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
High Speed Analog Devices
(Revised)

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- 1) Q.1 and Q.6 are Compulsory.
- 2) Attempt any two remaining questions from each section.
- 3) Assume Suitable data if necessary.

SECTION – A

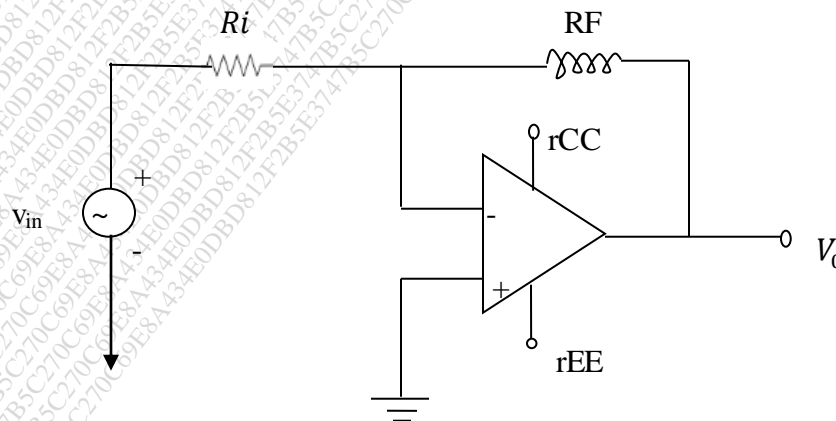
Q.1 Solve any five of the following.

10

- i) Draw Precision full wave rectifier.
- ii) Enlist the specification of IC AD8002.
- iii) For the instrumentation amplifier determine the value of R_G if the gain required is 1000, the values of various resistances are $R_1 = 100k\Omega$, $R_2 = 100k\Omega$ and $R_F = 470K\Omega$?
- iv) What do you mean by free running, capture and lock range.
- v) Draw the PSRR characteristics.
- vi) Give the ideal characteristics of op-amp.
- vii) Define CMRR and Slew rate.
- viii) Give the applications of PLL

Q.2 a) Explain in detail block diagram of OP-AMP with its pin configuration, symbol and ideal characteristics. 08

b) The 741 Op-Amp having following parameter is connected as a inverting amplifier with $R_1 = 470K\Omega$ & $R_f = 4.7K\Omega$ $A = 100,000$ $R_o = 70\Omega$ $R_i = 2M\Omega$ $F_o = 5$ HZ, supply voltage = $\pm 15V$, O/P voltage swing = $\pm 13V$ calculate the values of AF, R_iF , R_oF , F_f . 07



- Q.3 a) Explain the operation of precision full wave rectifier with circuit diagram and waveforms. 07
 b) Explain the following terms with reference to PLL. 08
- 1) Resolution
 - 2) Linearity
 - 3) Accuracy
 - 4) Settling time
- Q.4 a) Explain VFB model and Bode plot of VFB Model. 08
 b) Give the Noise comparison between CFB and VFB op – amps. 07
- Q.5 Write Short note on any three 15
- i) Sample and Hold Circuit
 - ii) Schmitt trigger
 - iii) Summing amplifier
 - iv) V to I Converter.

SECTION – B

- Q.6 Solve any five. 10
- i) Give the relation between sampling rate, resolution and architecture.
 - ii) What are the features of HEMT.
 - iii) What are the requirements of high speed devices circuits?
 - iv) Draw the diagram of Pipelined ADC's.
 - v) What are the benefits of heterojunction BJT?
 - vi) Give the comparison between successive approximation and pipelined ADC's

- Q.7 a) Explain in detail principle and operation of high electron mobility transistors. 08
 b) Explain in detail the principle of operation and benefits of hetero junction BJT for high speed applications. 07
- Q.8 a) Explain differential line drivers and receivers. 08
 b) Explain the optimizing feedback network for maximum bandwidth flatness. 07
- Q.9 a) Explain the Successive approximation ADC's in detail. 07
 b) Explain high speed ADC applications in software radios. 08
- Q.10 Write short note on (Any three) 15
- i) Cable drivers and receivers.
 - ii) ADC applications in video.
 - iii) Materials for high speed devices and circuits.
 - iv) ADC applications in ultrasound.
 - v) High speed clamping amplifiers.

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-136
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Signals & Systems
[OLD]

[Time: Three Hours]

[Max. Marks: 80]

N.B Please check whether you have got the right question paper.

- 1) Q.No. 1 from Section A and 6 from Section B are compulsory.
 2) From remaining solve any two questions from each section.
 3) Assume suitable data if required.

Section A

- Q.1 Answer any five. 10
- 1) Define even & odd signal?
 - 2) Plot standard test signals?
 - 3) Define causal system & non causal system.
 - 4) Prove that energy of power signal is infinite?
 - 5) Prove that $\delta(n) = u(n) - u(n - 1)$?
 - 6) Compare energy signal & power signal.
 - 7) Define signal?
 - 8) What is Convolution?
- Q.2 a) Sketch $x(t) = [u(t) + r(t - 1) - 2u(t - 3)].u(-t + 5)$ 08
 b) Explain convolution integral. 07
- Q.3 a) What is system? Classify & explain with example. 08
 b) Check whether the following systems are linear and time invariant or not: 07
- 1) $y(t) = x^2(n) + x(n^2)$
 - 2) $y(t) = x(t) \sin t$
- Q.4 a) Compute linear convolution by graphical method? $x(n) = \{1, 2, 1, 2\}$ $h(n) = (2, 1, 2, 1)$ 08
 b) If $x(n) = (1, 2, -1, 3, -2, 0, 2)$ Sketch 1) $x(n + 2)$ 2) $3x(n - 2)$ 3) $x(2 - n)$ 07
- Q.5 Write short notes on (any three) 15
- 1) Integro differential equation.
 - 2) Analogy between CT FS & DT FS
 - 3) Properties of convolution sum
 - 4) Folding & shifting operations of signal

Section B

- Q.6 Answer any five:- 10
- 1) What is auto correlation & cross correlation?
 - 2) Write any two system properties in terms of impulse response?
 - 3) What is difference between ESD & PSD?
 - 4) What is the application of correlation?
 - 5) What is correlogram?
 - 6) Obtain the FT of unit step signal?
 - 7) What is a need of FT?
 - 8) Prove the equation $R_x(0) = E$
- Q.7 a) Explain properties of Fourier series? 08
 b) Find the Fourier transform of $x(t) = \cos(\omega t)$ plot the magnitude spectrum? 07
- Q.8 a) Determine the auto correlation of the following power signal $x(t) = \sin \omega t$ 08
 b) Prove that Auto correlation function ACF & power spectral density form a Fourier transform pair? 07
- Q.9 a) Determine Autocorrelation of the sequence $x(n) = (0,1,2,3)$ 08
 b) What is ESD? State and prove properties of ESD. 07
- Q.10 Write short notes on (any three) 15
- 1) Sampling of band pass signal
 - 2) Properties of PSD
 - 3) Properties of ACF of energy signal
 - 4) Parseval's power theorem

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-278
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Electrical Machines & Instrumentation
(Old)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- 1) Q. no 1 and Q. no 6 are compulsory.
 - 2) Attempt any two questions from remaining four questions from each section.

Section A

- Q.1 Solve any FIVE following. 10
- a) Give the difference between synchronous motor and induction motor?
 - b) DC Shunt Motor runs at constant speed. Why?
 - c) Give the difference between 3 point starter and 4 point starter?
 - d) Why the rotor copper bars are not parallel to the rotor shaft?
 - e) Why for Three phase induction motor starter is needed?
 - f) Write two applications of Stepper motors.
 - g) Compare squirrel cage rotor & phase wound rotor.
 - h) Draw Torque – Slip Curves for three phase induction motor.
- Q.2
- a) Explain types of DC shunt motor starter? 08
 - b) Explain different methods of speed control for DC Shunt motor. 07
- Q.3
- a) Explain the constructional details of Three Phase Squirrel Cage I.M. 07
 - b) Derive an expression for running torque of Three Phase I.M. and obtain the conditions for maximum starting and running torques. 08
- Q.4
- a) What are different starting methods of 3-phase I.M.? Explain D.O.L. starter. 07
 - b) A 4-pole, 500V DC shunt motor has 720 wave-connected conductors in the armature. The full load armature current is 60A and the useful flux per pole is 0.03Wb. The armature resistance is 0.2 Ohm. Calculate the full load speed of the motor. Neglect brush contact drop. 08
- Q.5
- a) Explain the construction and working of Stepper motor. 08
 - b) Explain the construction and types of servo motors. 07

Section B

- Q.6 Solve any FIVE from following 10
- a) What is digital tachometer?
 - b) Give classification of transducer?
 - c) State merits and demerits of piezoelectric transducer.
 - d) What are active and passive transducers?
 - e) Explain the working principle of thermocouple.

- f) Explain semiconductor strain gauge.
 - g) Explain need of signal conditioning.
 - h) Give the classification of displays.
- Q.7 a) With a suitable diagram explain the working of LVDT. List its applications. 08
 b) Explain interfacing techniques of transducers with microcontrollers/microprocessors. 07
- Q.8 a) With a neat block diagram explain sound level meter. 07
 b) What is thermistor? Explain thermistors with advantages, disadvantages and applications. 08
- Q.9 a) Explain the operation x-y plotter with its applications. 08
 b) Explain photo voltaic cell in detail. 07
- Q.10 Attempt any THREE 15
 a) Smoke and fire Detector
 b) Water level meter
 c) Object counter
 d) VAW meter

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-326
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Electronics Devices & Circuits – I
(OLD)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- 1) Question number one and six are compulsory.
 - 2) Attempt any two questions from the remaining each Section.
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary.
 - 5) Use of non-programmable calculator is allowed.

Section A

- Q.1 Solve any five:- 10
- 1) What do you mean by efficiency of rectifier? Explain.
 - 2) Write few applications of BJT?
 - 3) Explain the need of biasing.
 - 4) What are the methods of biasing?
 - 5) Define Transconductance of FET.
 - 6) What is the cut in voltage in semiconductor?
 - 7) What is Avalanche Breakdown?
 - 8) What is emitter follower?
- Q.2 a) With the help of neat diagram explain center tapped full wave rectifier with capacitive filter. Also draw its input output characteristics. 08
- b) Explain in detail. 07
- i) Solar cell
 - ii) Varactor Diode
- Q.3 a) What is need of Biasing? Also explain fixed bias method. 07
- b) The h parameter of transistor in CE circuit are $h_{ie}=1k\Omega$, $h_{re} = 10 \times 10^{-4}$, $h_{fe}=50$, $h_{oe}=100\mu$ mhos, $R_L = 1k\Omega$, the transistor is supplied from a signal source of resistance 1000Ω . Determine the value of input and output resistance, voltage and current gain in the amplifier stage. 08
- Q.4 a) Explain the biasing of enhancement MOSFET with neat circuit diagram? 08
- b) Explain CMOS Inverter in detail. 07
- Q.5 Write Short Note On (Any Three) 15
- 1) Point Contact Diode
 - 2) Types of Filters
 - 3) Compensation Circuit
 - 4) Stability Factor
 - 5) Difference between E & D type MOSFET.

Section B

- Q.6 Explain the following (Any Five) 10
- 1) What is Barkhausen criteria for oscillation?
 - 2) Explain the difference between positive and negative feedback.
 - 3) Define $f\beta$ and $f\alpha$. What is the relation between these two?
 - 4) What is an opt coupler?
 - 5) Why do you use three RC Sections in RC phase shift oscillator?
 - 6) Define bandwidth and gain of an amplifier.
 - 7) Give the type of negative feedback connection.
 - 8) How does Hartley Oscillator differ from Colpitt's oscillator in construction?
- Q.7 a) Explain Video amplifier in detail. 08
b) Explain the effect of coupling & bypass capacitor on the performance of BJT amplifier. 07
- Q.8 a) Explain heterojunction BJT in detail. 08
b) What is an Optocoupler? What are its applications? 07
- Q.9 a) Explain high frequency π model for a transistor. 07
b) The following low frequency parameters are known for a given transistor at $I_c = 10\text{ ma}$, and $V_{ce} = 10\text{ v}$, and at room temperature $h_{ie} = 500\Omega$, $h_{oe} = 4 \times 10^{-5}$, $h_{fe} = 100$, and $h_{re} = 10^{-4}$. At the Same operating point $f_T = 500\text{ mhz}$ and $cb'c = 3\text{ pf}$. Calculate the values of all the hybrid parameters. 08
- Q.10 Write Short Note on (Any three) 15
- 1) RC Phase Shift Oscillator
 - 2) Emitter follower at high frequency.
 - 3) Current series feedback amplifier.
 - 4) CE short circuit gain
 - 5) Heterojunction Bipolar Transistor

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-302
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (All)
Engineering Mathematics – III
(Revised)

[Time: ThreeHours]

[Max.Marks: 80]

N.B Please check whether you have got the right question paper.

- 1) Q. No. 1 and Q. No. 6 are compulsory.
 2) Solve any two questions from remaining questions of each section.
 3) Figures to the right indicate full marks.
 4) Assume suitable data, if necessary.

Section – A

- Q.1 Solve any five from the following. 10
- Solve $(D^2 - 13D + 36)y = 0$
 - Solve $(D^3 - 7D - 6)y = 0$
 - Find particular integral (P.I.) of $(D^3 + 1)y = 2^x$
 - Find Particular integral (P.I.) of $(D^2 + 4)y = \sin 3x$
 - Write Kirchhoff's voltage law to electrical ckt.
 - Set – up the equation of motion of a body of weight 10kg attached to a spring given that 20 kg weight will stretch the spring to 10cm.
 - Find the Fourier cosine transform of $f(x) = e^{-2x}$
 - Find the Fourier transform of $f(x) = 1; \quad 0 < x < a$
 $= 0 \quad \text{otherwise}$
- Q.2 05
- Solve $(D^2 + 6D + 10)y = 50x$ 05
 - An emf of 200v is in series with a 10 ohm resistance, a 1 henry inductor and 0.02 farad capacitor. At t=0 the charge Q and current I are zero. Find Q & I at any time t. 05
 - Solve $(D^2 + 9)y = x \cos x$. 05
- Q.3 05
- Solve $(D^2 - 1)y = xe^x \sin x$ 05
 - A body executive damped forced vibrations given by the equation 05

$$\frac{d^2x}{dt^2} + 2k \frac{dx}{dt} + b^2x = e^{-kt} \sin wt$$
 Solve the equation for both the cases when $w^2 \neq b^2 - k^2$ and $w^2 = b^2 - k^2$.
 - Find $f(x)$ if $Fs(\lambda) = \frac{e^{-a\lambda}}{\lambda}$ 05

- Q.4
- a) $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin \log(x + 1)$ 05
- b) The differential equation satisfied by beam uniformly loaded with one end fixed & second end subjected to a compressive force is given by $EI \frac{d^2y}{dx^2} = py - \frac{1}{2}wx^2$ show that the elastic curve for the beam With condition $y = 0, \frac{dy}{dx} = 0$ at $x = 0$ given by $y = \frac{w}{pn^2} (1 - \cos nx) + \frac{wx^2}{2p}$, where $n^2 = \frac{p}{EI}$ 05

- c) Express $f(x) = 1, 0 \leq x \leq \pi$ as a Fourier sine integral and hence evaluate $\int_0^\infty \frac{(1 - \cos \pi \lambda) \sin \lambda x}{\lambda} d\lambda$ for $x > \pi$ 05

- Q.5
- a) Solve by using the method of variation of parameters. $(D^2 + 4)y = \sec 2x$ 05
- b) Solve the integral equation $\int_0^\infty f(x) \cos \lambda x dx = e^{-\lambda}$ 05
- c) Solve $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x + 2 \log x$ 05

Section – B

- Q.6 Solve any five from the following. 10

- a) Find the mean of the following data

Class	0-10	10-20	20-30	30-40	40-50
Frequency	14	17	22	26	23

- b) $\nabla \cdot \vec{r} \text{ if } \vec{r} = xi + yj + zk$
- c) State Green's Theorem.
- d) Find $\nabla \phi$ at $(1,1,1)$ if $\phi = x^2 + y^2 + z^2$.
- e) Find the area under the normal curve between $z = 0$ to $z = 2$.
- f) Find the Karl Pearson's coefficient of skewness if mean =3, mode = 5.2 and Standard Deviation = 2.5
- g) Show that $\vec{A} = 3y^4z^2i + 4x^3z^2j - 3x^2y^2k$ is solenoidal.
- h) The probability of certain college students will pass is 0.8 Determine the probability that out of 10 students exactly 6 will pass.

Q.7 a) Evaluate $\int_C [(x^2 + 2y)dx + (4x + y^2)dy]$ by Green's theorem, where c is the boundary of the region bounded by $y = 0$, $y = 2x$ and $x + y = 3$. 05

b) Show that $\vec{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both solenoidal and irrotational. 05

c) Find the Karl Pearson's coefficient of skewness for the following data. 05

Marks	0-5	5-10	10-15	15-20	20-25	25-30
No. of Students	4	6	8	12	7	2

Q.8 a) Find the directional derivative of $\phi = xy^2 + yz^2$ at the point $(2, -1, 1)$ in the direction of the vector $i + 2j + 2k$. 05

b) Determine the equation for the regression line of the force on time for the following data 05

Force	11.4	18.7	11.7	12.3	14.7	18.8	19.6
Time	0.56	0.35	0.55	0.52	0.43	0.34	0.31

c) Evaluate by Stokes theorem $\iint_S \nabla \times \vec{F} \cdot \hat{n} \, ds$ for the vector field $\vec{F} = 4yi - 4xj + 3k$, where S is a disk of radius one lying on the plane $z = 1$. 05

Q.9 a) The mean I.Q. of large number of children of age 14 is 100 with standard deviation 16. Assuming the distribution of I.Q. is normal, find the percentage of children having I.Q. between 70 to 120. 05

b) Evaluate $div(\vec{r} \times \vec{a})$, where \vec{a} is a constant vector and $\vec{r} = xi + yj + zk$. 05

c) Find the work done in moving a particle in the force field given by $\vec{F} = yi + zj + xk$ along the parabola $y^2 = x$ from the origin to the point $4i + 2j$. 05

Q.10 a) Find the standard deviation of the following data 05

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	15	25	25	10	10	5

b) Express $\iiint (y^2z^2i + z^2x^2j + z^2y^2k) \, d\vec{s}$ as a volume integral. Evaluate it by Gauss divergence theorem over the upper part of the sphere $x^2 + y^2 + z^2 = 1$ above the XY plane. 05

c) Show that vector field \vec{A} is irrotational. Find scalar potential function ϕ such that $\vec{A} = \nabla\phi$ if $\vec{A} = y^2i + 2xyj - z^2k$. 05

Total No. of Printed Pages: 02

SUBJECT CODE NO:- H-431
FACULTY OF SCIENCE AND TECHNOLOGY
S.E.(ECT/E&C/IE)
Data Structure & Linux
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

- N. B
- Please check whether you have got the right question paper.
1. Q. No. 1 and Q. No. 6 are compulsory
 2. Attempt any two questions from Q. 2 to Q. 5 and form Q. 7 to Q. 10 of each section.
 3. Figure to the right indicate full marks.

Section A

- | | | |
|------|--|----------|
| Q. 1 | Attempt any five of following: | 10 |
| | <ol style="list-style-type: none"> a) Define abstract data types. b) Define arrays. c) What are properties of binary tree d) Explain malloc () function. e) List drawbacks of sequential representation. f) How two dimensional array is represented in C. g) What do you mean by double ended queue? | |
| Q. 2 | <ol style="list-style-type: none"> a) Write C program to implement queue using array. b) Write array as an ADT. | 08
07 |
| Q. 3 | <ol style="list-style-type: none"> a) Explain insert and delete operations on circular linked list. b) What is breadth first search? Explain with an example | 07
08 |
| Q. 4 | <ol style="list-style-type: none"> a) Explain concept of infix, postfix and prefix expressions. b) Write a program for addition of two polynomials using arrays. | 07
08 |
| Q. 5 | Write a short note on any three. | 15 |
| | <ol style="list-style-type: none"> i. Pointers ii. Priority queue iii. Linked list representation of stack iv. Comparison of singly, doubly and circular linked list. | |

Section B

- Q. 6 Solve any five. 10
- a) What is directed graph and undirected graph?
 - b) Define recursion with the help of example.
 - c) What is incidental edge of a graph?
 - d) Define root of a tree.
 - e) Define level of a node in tree.
 - f) Define CLI and GUI in Linux.
 - g) Write history of Linux operating system.
- Q. 7 08
- a) Explain LINUX architecture.
 - b) Explain any one tree traversal algorithm with example. 07
- Q. 8 08
- a) Explain basic commands in Linux. Also explain how to get help about commands.
 - b) Explain binary search algorithm. 07
- Q. 9 07
- a) Write a program for Linear search.
 - b) Explain heap sort with a example. 08
- Q. 10 Write a short note on any three. 15
- i. DFS
 - ii. Linux distributions.
 - iii. GCC compiler.
 - iv. Selection sort.

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-430
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Data Structure
(OLD)

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
- 1) Q. No. 1 from Section A and 6 from Section B are compulsory.
 - 2) From remaining solve any two questions from each section.

Section A

- | | | |
|-----|--|----------|
| Q.1 | Answer any five:- | 10 |
| | <ol style="list-style-type: none"> 1) Define Static & dynamic data structure? 2) Explain Insertion operation on linked list. 3) What are Infix, prefix, Postfix notations? 4) What is Stack and where it can be used? 5) How structure is different from array? 6) State the difference between arrays and linked lists? 7) What is a circular Queue? 8) How is an Array different from Linked List? | |
| Q.2 | <ol style="list-style-type: none"> a) Write a program for representation of a queue as an array. b) Write syntax of following data structure: <ol style="list-style-type: none"> 1) Pointer 2) Function 3) Structure 4) Array | 08
07 |
| Q.3 | <ol style="list-style-type: none"> a) Write an algorithm to evaluate postfix expression. b) Explain Circular linked list. | 08
07 |
| Q.4 | <ol style="list-style-type: none"> a) Explain Polynomial manipulation. b) Write a program to demonstrate array as ADT. | 08
07 |
| Q.5 | Write short notes on (any three) | 15 |
| | <ol style="list-style-type: none"> 1) Stack 2) Priority Queue 3) Applications of linked lists 4) Storage classes. | |

Section B

- Q.6 Answer any five: 10
- 1) What is weighted graph?
 - 2) What do you mean by shortest path?
 - 3) What are the different binary tree traversal techniques?
 - 4) Differentiate BFS and DFS.
 - 5) What is left sub-tree & right sub-tree?
 - 6) What is sorting?
 - 7) What is Forest?
 - 8) Define B-tree of order M.
- Q.7 a) Explain DFS method of graph traversal. 08
 b) Explain Minimum cost spanning tree. 07
- Q.8 a) What is binary search tree? Construct a binary search tree for: 08
 14,15,4,9,8,17,3,6,18,2
 b) Explain inorder traversal with example. 07
- Q.9 a) Explain the Quick sort algorithm. 08
 b) Write an algorithm for Insertion sort. 07
- Q.10 Write short note on (any three) 15
- 1) Linear search with algorithm
 - 2) B+ trees
 - 3) Spanning tree
 - 4) Bubble sort

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-327
FACULTY OF SCIENCE AND TECHNOLOGY
S.E (ECT/E&C/IE)
Electronics Devices & Circuits
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory.
 2. Solve any two from Q.2, Q.3, Q.4 and Q.5.
 3. Solve any two from Q.7, Q.8, Q.9 and Q.10.
 4. Figures to the right indicates full marks.
 5. Assume suitable data, if necessary.

Section A

- | | | |
|-----|--|----------|
| Q.1 | Attempt any five: | 10 |
| | <ol style="list-style-type: none"> a) Define Depletion Layer & Potential barrier. b) Define PIV of Diode & Saturation Current. c) Define a Rectifier & Amplifier with Block Diagram. d) Define Ripple factor & Load Regulation e) Define Resistance, Capacitance & Inductance; with Symbols f) Define Intrinsic & extrinsic semiconductors g) Draw the circuit of Emitter follower. | |
| Q.2 | <ol style="list-style-type: none"> a) What is a Diode? Explain FB mode with the help of symbol, schematic, graphs & circuit diagram. b) Draw the symbol of Zener Diode & Explain Zener breakdown & Avalanche breakdown. | 08
07 |
| Q.3 | <ol style="list-style-type: none"> a) List out of types of BJT Biasing and explain any one with neat circuit diagram & DC analysis. b) Draw and explain the operation of class B push pull amplifier. State application of this circuit. | 08
07 |
| Q.4 | <ol style="list-style-type: none"> a) Explain the operation of CMOS Inverter in detail. b) With neat construction & working explain the Drain characteristics of JFET. | 08
07 |
| Q.5 | Write notes on: (any three) | 15 |
| | <ol style="list-style-type: none"> a) Differentiate between HW, FW & Bridge Rectifier b) Define a Filter? List out various types of filters & explain any one. c) Clampers d) Handling precautions of CMOS devices. | |

Section B

- Q.6 Answer the following questions: (any five): 10
- List the 3 pin Fixed DC voltage IC numbers for positive and negative voltage regulators.
 - State the limitations for voltage multiplier circuit.
 - If $L_1 = 1mH$, $L_2 = 2mH$ and $c = 0.1nf$ What is the frequency of oscillation of the Hartley oscillator?
 - What is voltage shunt and current series feedback?
 - Draw Wien bridge oscillator?
 - What is Relaxation oscillator? State its applications.
 - What is the response of an Integrator for sine wave and square wave input?
- Q.7 a) Explain the what is symmetrical and Asymmetrical triggering? Explain. 08
- b) Explain Schmitt trigger circuit in detail 07
- Q.8 a) Draw and explain the operation of Hartley oscillator. State its advantages. 07
- b) In colpitts oscillator, the values of the Inductor and capacitors in the tank circuit are $L = 40$, $C_1 = 100PF$ & $C_2 = 400PF$. Find. 08
- The frequency of oscillations.
 - If the output voltage is 6 volt. Find the feedback voltage.
- Q.9 a) What are IC voltage regulators? How they are classified? Explain variable voltage regulator. 08
- b) Explain the operation of voltage doubler circuit. State its application's. 07
- Q.10 Write note (any three) 15
- Multivibrator as a timer
 - LC tank circuit as an oscillator
 - Need of Voltage multipliers
 - RC Differentiator

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-395
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/E&C/IEC)
Communication Engineering
(OLD)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 and Q. No.6 are compulsory.
 - ii) Solve any two from remaining from each sections.
- SECTION A**
- Q.1 Solve any five. 10
- a) Define modulation.
 - b) What do you mean by Noise?
 - c) Which are the sources of extra terrestrial Noise?
 - d) What is the application of AGC?
 - e) Define tracking, selectivity.
 - f) State the advantages of FM.
- Q.2 08
- a) Explain the different types of modulations. Draw the waveforms of FM.
 - b) Explain the different types of noise. 07
- Q.3 08
- a) Explain the concept of angle modulation.
 - b) Explain the direct method of FM generation. 07
- Q.4 08
- a) Explain the working principle and block diagram of super heterodyne receiver.
 - b) Explain the RF amplifier. 07
- Q.5 08
- a) Explain the different types of FM demodulators.
 - b) Give comparison between FM and AM. 07
- SECTION B**
- Q.6 Solve any five. 10
- a) Define frame, resolution.
 - b) What do you mean by sampling frequency?
 - c) Which are the different types of scanning in television?
 - d) State working principle of PPM.
 - e) State special feature of delta modulation.
 - f) State the principle of magnetic recording.
- Q.7 08
- a) Explain the SSB receiver.
 - b) Explain the significance of amplitude limiter. 07

- Q.8 a) Explain the different types of Multiplexing techniques. 08
- b) Explain the PAM with waveform. 07

- Q.9 a) Explain the working principle of microphone and enlist its parts. 08
- b) Write short notes on “Magnetic Recording”. 07

- Q.10 a) Explain the working of PA system. 08
- b) Draw composite video signal. 07

Total No. of Printed Pages: 2

SUBJECT CODE NO:- H-396
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (ECT/E&C/IE)
Analog communication Engineering
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

1. Questions No.1 and Questions No.6 are compulsory
2. Attempt any two questions from remaining in each section.
3. Figures to right indicate full marks.
4. Assume suitable data, if necessary

Section - A

- | | | |
|------|---|----------|
| Q. 1 | Solve any five. | 10 |
| | <ol style="list-style-type: none"> a) Why do we need Modulation? b) Define modulation index. c) State the sampling theorem d) Draw the wave form of PAM and PWM waves. e) Define bandwidth and state the bandwidths of different signals. f) Write down the equation for FM and PM. g) List the methods of suppressing SSB? h) What are the advantages of SSB over DSBSC? | |
| Q. 2 | <ol style="list-style-type: none"> a) Draw and explain the Am broadcast transmitter. b) Derive the necessary relation for modulation by several sine waves. | 08
07 |
| Q. 3 | <ol style="list-style-type: none"> a) Compare DSBFC, DSBSC and SSB. b) Explain TDM and FDM Techniques. | 08
07 |
| Q.4 | <ol style="list-style-type: none"> a) What are generation methods of FM? Explain any one in detail. b) Draw the block diagram of I.S.B and explain it in detail. | 08
07 |
| Q. 5 | Write short note (any three) | 15 |
| | <ol style="list-style-type: none"> a) Pre –emphasis and De-emphasis b) Advantages and Disadvantages of FM c) Balanced Modulator d) Noise Triangle in FM e) Broadcast and point to pint communication f) VSB | |

Section – B

- Q. 6 Solve any five questions. 10
- a) State types of noise.
 - b) Define selectivity and sensitivity of radio receiver.
 - c) Define Directivity and power gain of an antenna.
 - d) Define tracking and state its types.
 - e) What is the function of amplitude limiter in FM Receiver?
 - f) Difference between FM and PM.
 - g) Define critical frequency and skip distance.
 - h) Define S/N ratio.
- Q.7 a) Explain the working of phase discriminator with suitable circuit diagram. 08
- b) What is the Principle of AGC? Explain simple and delayed AGC in detail. 07
- Q.8 a) What type of mixers used in AM receiver? Explain any one in detail. 08
- b) Explain Ground wave propagation with its advantages and disadvantages. 07
- Q.9 a) What is the need of RF amplifier? State advantages and disadvantages of RF amplifier used in AM radio receiver. 08
- b) What is ionosphere? Explain reflection of sky wave in ionosphere. 07
- Q.10 Write short note (any three) 15
- a) Slope detector
 - b) Space Wave propagation
 - c) Noise temperature
 - d) Characteristics of receiver
 - e) Yagi –uda Antenna
 - f) MUF

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-170
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Digital Logic Design
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Question no.1 from section A & questions No.6 from section B are compulsory.
 2. From the remaining solve any two questions from each section.

Section A

- Q.1 Solve any five from the following 10
- a) Classify Logic families.
 - b) Draw 1:4 Demux Using Gates.
 - c) Define propagation delay time in digital IC.
 - d) Write truth table of full subtractor.
 - e) Comment on 'Noise immunity'.
 - f) Define & explain figure of merits.
 - g) Convert $(0011)_2$ into Gray.
 - h) Define minterm & maxterm.
- Q.2 07
- a) Explain CMOS NAND gate.
 - b) Explain different characteristics of digital IC's. 08
- Q.3 08
- a) Design & explain half subtractor & full subtractor.
 - b) Minimize the following logical function using k-map & realize the same. 07
- $$f = \sum m (0, 2, 4, 6, 11, 13, 15) + d (7, 9, 14)$$
- Q.4 07
- a) Design 16:1 multiplexer using 8:1 multiplexer.
 - b) Design Gray to Binary code converter. 08
- Q.5 Write short note on the following (Any three) 15
- a) ALU 74181
 - b) TTL logic family.
 - c) Digital comparator IC 7485
 - d) 4 bit parity generator & checker.

Section B

- Q.6 Solve any five from the following 10
- a) State applications of flip – flop.
 - b) Explain sequential logic circuit with an example.
 - c) Explain Race – around condition.
 - d) Compare moore & mealy machines.
 - e) Compare synchronous & asynchronous counter.

- f) Write applications of shift Register.
 - g) Explain entity in VHDL with example.
 - h) Draw state diag of MOD – 10 counter.
- Q.7 a) Explain the operation of SISO right shift Register with neat circuit diagram. 07
 b) Convert the following 08
 i. SR FF to JK FF
 ii. T to DFF
- Q.8 a) Explain different modeling styles of VHDL. 07
 b) Write VHDL code for all logic Gates. 08
- Q.9 a) Design 4 – bit synchronous counter using D type flip – flop. 07
 b) Explain following terms 08
 i. State diagram
 ii. State table
 iii. State assignment
 iv. State reduction.
- Q.10 Write short note on (any three) 15
 i) Design steps of Asynchronous counter
 j) IC 7490
 k) MS- JK flip – flop
 l) Moore & mealy machines

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-362
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (ECT/E&C/IE)
Network Analysis
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

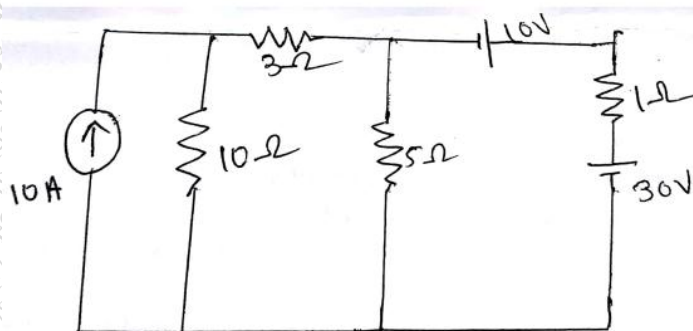
N. B

1. Q. 1 and Q. 6 are compulsory.
2. Solve any two from Q. 2 Q. 3, Q. 4 and Q. 5.
3. Solve any two from Q. 7 Q. 8, Q. 9 and Q. 10.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.

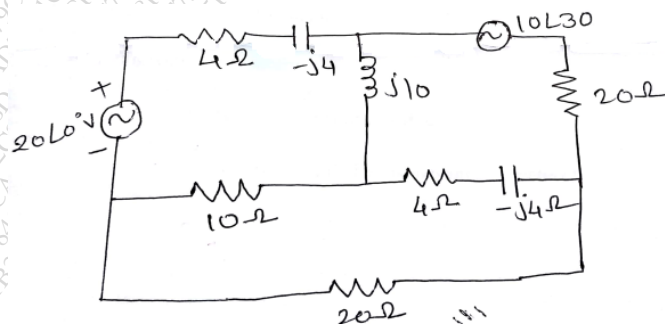
Q. 1 Solve any five 10

- a) Write the formula of star to delta conversion
- b) What is meant by Super mesh and super node?
- c) State the principle of duality.
- d) What is meant by resonance?
- e) Define graph and tree.
- f) State the Dot Convention
- g) Define graph and tree.

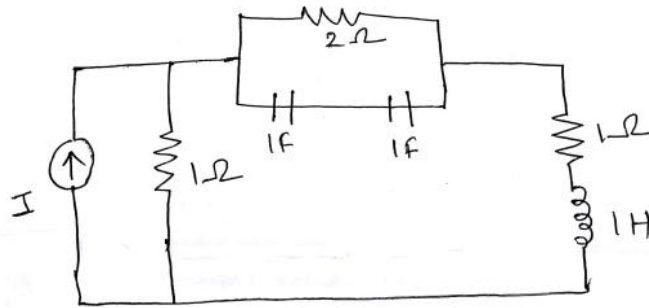
Q. 2 a) By using source transformation find the current through $10\ \Omega$ resistance 08



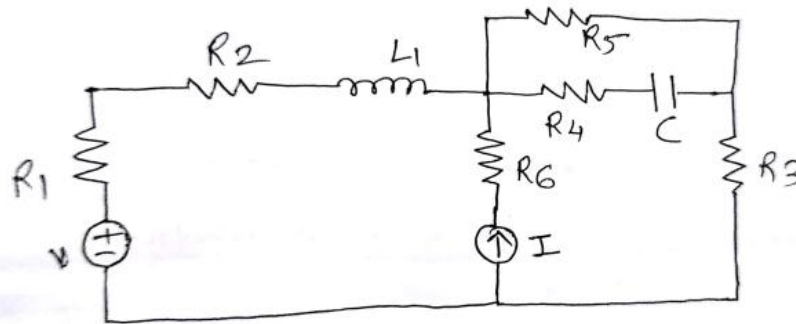
b) Find the value of the current i_3 in the network shown in the fig. 07



Q. 3 a) For the circuit shown fig. Draw its tree. Draw its fundamental cut set. 07



b) A network shown in following fig, draw the oriented graph and write the i) Incidence Matrix ii) f-cut set matrix iii) Tie set matrix 08



Q. 4 a) Explain the selectivity and bandwidth of parallel resonant circuit. 07

b) A parallel circuit has a fixed capacitor and variable inductor Q of inductor is 4 and is constant. Find the value of L and C for the circuit impedance of $(100 + j_0)$ at $f = 2.4 \text{ Mhz}$. what is B.W at matched condition. 08

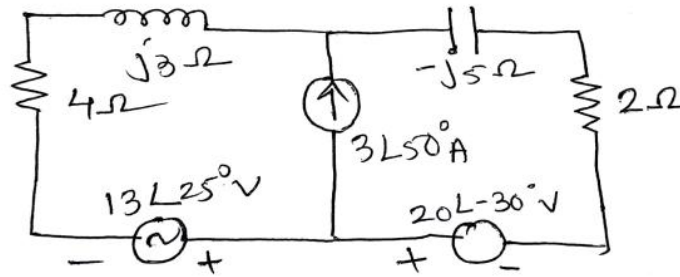
Q. 5 Write a short note on (any three) 15

- a) Nodal analysis and Mesh analysis
- b) Bandwidth and Selectivity
- c) Compare series and parallel resonance
- d) Significance of Quality factor

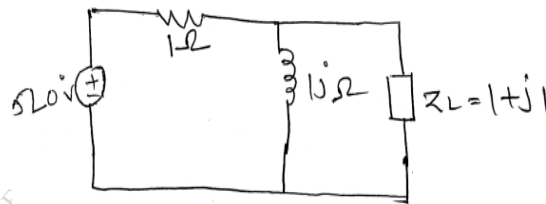
Q. 6 Solve any five 10

- a) State Thevinion's theorem.
- b) List the basic filters network
- c) List the different types of transmission line.
- d) State Milliaman's theorem.
- e) Why ABCD parameters are called transmission parameters?
- f) Why Y-parameters are called short circuit parameters
- g) State the limitations of superposition theorem.

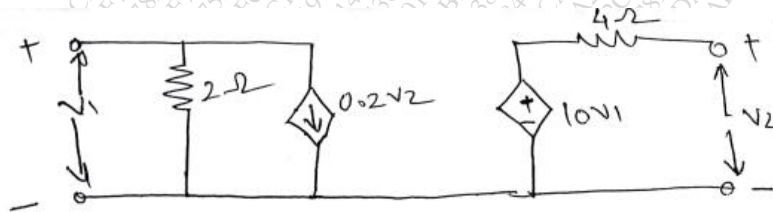
- Q. 7 a) Find the current I in the network shown by the superposition theorem 08



- b) Calculate the current through Z_L using Norton's theorem 07



- Q. 8 a) Find Y- parameters of the network shown in Fig. 08



- b) Obtain Z – parameter in terms of H-parameter. 07

- Q. 9 a) State and explain basic filters with frequency response. 07

- b) Design constant K-low pass filter (π and T – section) having cut of frequency of 4 KHz and nominal characteristic impedance of 500Ω . 08

- Q. 10 Write Short note on (any three) 15

- Parallel connection of two port network
- Explain the term primary constant and secondary constant of transmission line.
- Transmission line parameters
- Compensation theorem

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-361
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Network Analysis
(OLD)

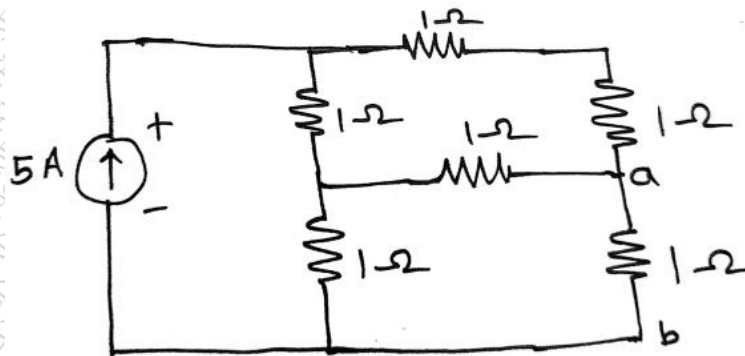
[Time: Three Hours]

[Max. Marks:80]

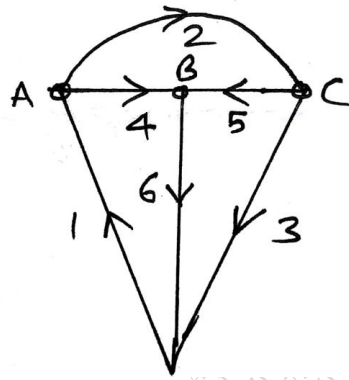
- N.B
- Please check whether you have got the right question paper.
- (i) Question No.1 from section A and Question no 6 from Section B are Compulsory.
 - (ii) From the remaining, solve any two questions from each Section.
 - (iii) Figures to the right indicate full Marks.

Section – A

- | | | |
|-----|--|----|
| Q.1 | Solve any five | 10 |
| | <ul style="list-style-type: none"> a) Define Mesh and super mesh. b) State significant principle of duality c) Distinguish between voltage and current source d) Define current magnification factor e) Define four terminal equalizers f) Define any two types of network g) Write Fr for RLC series as well as parallel | |
| Q.2 | a) State and explain superposition theorem with proof | 08 |
| | b) Derive the relation between quality factor (Q_r) and detuning factor (δ) of RLC series circuit. | 07 |
| Q.3 | a) Using current sources shifting and source transformation find voltage a-b (V_{ab}). | 08 |



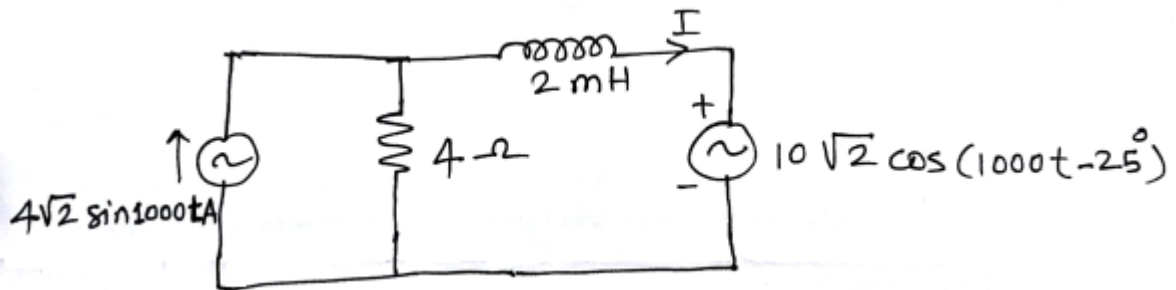
- b) For the given graph, write the incidence matrix, reduce incidence matrix, cut set matrix and 07 number of maximum possible trees



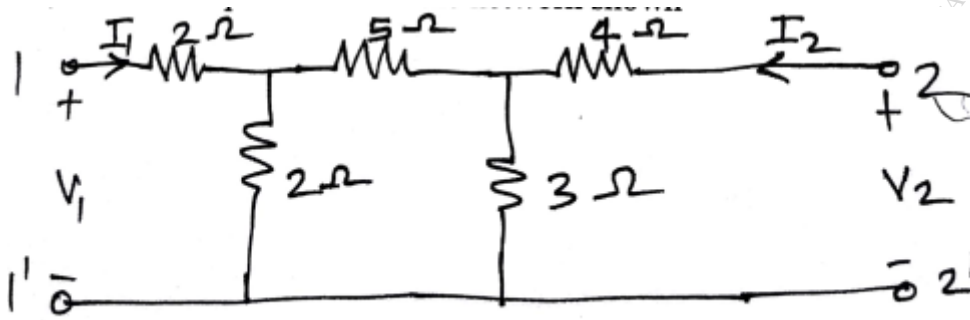
- Q.4 a) Explain Tie set matrix. 08
 b) What is mesh or loop analysis? Explain with suitable example 07
- Q.5 Write a short note on 15
 i. Concept of Tree & Co-Tree
 ii. Parallel Resonance
 iii. Decibel and Neper.

Section – B

- Q.6 Solve any five 10
 a) State Substitution theorem
 b) Explain briefly ABCD parameters
 c) Why Y parameters are called short circuit admittance parameter
 d) Write a note on initial conditions in basic circuit element.
 e) State Laplace transform of delayed standard time function.
 f) Write the Laplace transform of unit step and unit impulse signal
 g) State Millman's Theorem.
- Q.7 a) Define resonance. Derive the expression for resonant frequency of the series RLC circuit 08
 b) Use superposition theorem to find I in circuit. 07



- Q.8 a) Establish relationship between Z and Y parameters 08
 b) Find the Z parameters of the network shown 07



- Q.9 a) Define LT of function $f(t)$. Derive the LT of the standard time functions. 08
- b) Why to study m-derived filters. Derive m form derived low pass filter? 07
- Q.10 Write short note on 15
- i. Comparison of series and parallel resonance
 - ii. Bandwidth and selectivity
 - iii. Compare Thevenin's Theorem with Norton's Theorem.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-206
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (EC/ECT/IEC/E&C)
Electronics Devices & Circuits – II
(OLD)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q. 01 from section A and Q. 06 from Section B are compulsory.
 - 2) Solve any two questions from remaining questions from each section and
 - 3) Assume suitable data wherever necessary.

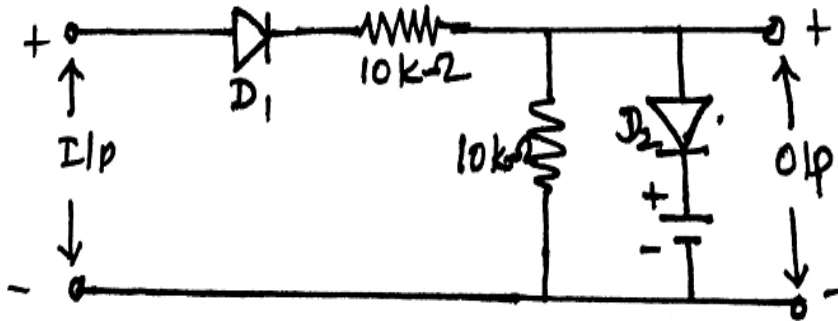
SECTION – A

- Q.1 Solve any five questions. 10
- a) Explain working of LASER diode in brief.
 - b) Define a power amplifiers with suitable block diagram?
 - c) Draw the construction & symbol of Gunn diode
 - d) Define CMRR & SR of op-amp?
 - e) Draw block diagram of OpAmp
 - f) Draw the circuit diagram of class C power amplifier
 - g) Draw the symbol of Tunnel diode & State its applications.
- Q.2 08
- a) Explain the working of Schottky Diode with the help of V-I characteristics.
 - b) Explain the working of IMPATT diode with the help of V-I characteristics. 07
- Q.3 08
- a) Explain the working of Class – A transformer coupled power amplifier
 - b) Prove that the efficiency of Class – B power amplifier is 78.5% 07
- Q.4 08
- a) What are the types of Differential amplifiers? Explain its basic circuit with DC analysis.
 - b) Compare & Contrast the ideal & practical characteristics of OpAmp 741 07
- Q.5 08
- a) Explain the need of heat sink & its design
 - b) Explain level shifter circuit in detail. 07

SECTION –B

- Q.6 Solve any five questions. 10
- a) Differentiate between symmetric and asymmetric triggering.
 - b) Which multivibrator can be used as a timer? How?
 - c) Define time base circuits
 - d) Define a sweep time & restoration time in blocking oscillators?
 - e) Define bootstrapping? What is its need?
 - f) What do you mean by self bias & Fixed bias?
 - g) Which multivibrator can be used as a Flip – Flop? How?

- Q.7 a) Draw the frequency response of integrator for sine wave input 08
 b) Explain the working of biased positive clipper & clamper 07
- Q.8 a) Explain UJT sweep circuit with circuit diagram. 08
 b) Explain Miller Sweep generator with neat circuit diagram & waveforms 07
- Q.9 a) Explain transistorized Schmitt Trigger circuit with neat circuit diagram & waveforms. 08
 b) For the circuit shown below the input is $50 \sin \omega t$. draw the transfer characteristics and input output wave forms assuming ideal diodes. 07



- Q.10 a) Differentiate between Diode control & RC control blocking oscillator 08
 b) Write a short note on current & voltage time base generators. 07