CBCGS/EXTC/Sem III/ Apm-III/ 08/05/18

Q. P. Code: 24393

(3 Hours) [Total Marks: 80]

N.B.: 1) Question No. 1 is Compulsory.

2) Answer any **THREE** questions from **Q.2** to **Q.6**.

3) Figures to the right indicate full marks.

Q.1. a) Evaluate the Laplace transform of $\sqrt{1+\sin t}$ [5]

b) Find directional derivative of $\phi = 4xz^3 + x^2yz$, at $(1,-2,-1)$ in direction of $2i-j-2k$ [5]

c) Find orthogonal trajectories of the family of curves $e^x \cos y - xy = c$. [5]

d) Obtain half range sine series for $f(x)=x, \quad 0<x<2$. [5]

Q.2. a) If $u+v=e^{2x}(x\cos 2y - y\sin 2y)$ then find analytic function $f(z)$ by Milne Thomson Method [6]

b) Find the Fourier series for $f(x)=9-x^2$, $-3 \le x \le 3$ [6]

c) Find the Laplace transform of the following

i) $L[t\sqrt{1+\sin t}]$ ii) $L\left[\frac{\sinh 2t}{t}\right]$ [8]

Q.3. a) Using Convolution theorem, find Inverse Laplace of $\frac{s}{(s^2+4)^2}$. [6]

b) Prove that $J_{-\frac{3}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left[-\frac{3}{x}\sin x + \frac{(3-x^2)}{x^2}\cos x\right]$. [6]

c) Find Fourier series for $f(x)=(\pi-x)^2$ in $0<x<2\pi$. Hence deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$$ [8]

Q.4 a) Find the Fourier transform of $f(t)=e^{-t^2}$ [6]

b) Show that the function $f_1(x)=1$, $f_2(x)=x$ are orthogonal on $(-1,1)$ and determine the constant A & B so that functions $f_3(x)=1+Ax+Bx^2$ is orthogonal to both $f_1(x)$ and $f_2(x)$ on that interval. [6]

c) Find bilinear transformation which maps the points $z=1, i, -1$ onto the points $w=i, 0, -i$ hence

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find the image of $|z|<1$ on to w plane find invariant points of this transformation [8]

Q 5 a) Solve using Laplace Transform $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+y=te^{-t}$ given $y(0)=4$ and $y'(0)=2$. [6]

b)Find Complex form of the Fourier series for $f(x)=e^{ax}$ in $-\pi<x<\pi$ where 'a' is a real constant. Hence deduce that $\frac{\pi}{a\sinh a\pi}=\sum_{n=-\infty}^{\infty}\frac{(-1)^n}{n^2+a^2}$ [6]

c) Verify Green's Theorem in the plane for $\oint_C (3x^2-8y^2)dx+(4y-6xy)dy$ where C is the boundary of the region defined by $y=x^2$ and $y=\sqrt{x}$. [8]

Q 6. a) Prove that $J_n'(x)=J_{n-1}(x)-2J_n(x)+J_{n+1}(x)$ [6]

b) Find the map of the line x-y=1 by transformation $w=\frac{1}{z}$ [6]

c) Evaluate $\iint_S \bar{F}.d\bar{s}$ where $\bar{F}=4x\hat{i}-2y^2\hat{j}+z^2\hat{k}$ where S is the region bounded by $x^2+y^2=4$, $z=0$, $z=3$ using Gauss divergence theorem. [8]

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EXTC/ Sem III / CBSGS/ AE-I / 08/05/18

Q. P. Code: 24887

U B

Max. Marks:80 **Duration:** 3hrs

NB:

(1) Question No.1 is compulsory.
(2) Answer any **three** from remaining questions.
(3) **Figures** to the right indicate full marks.
(4) Assume suitable data if required.

Q.1 **Attempt any four**

a Give the equation for the current in semiconductor diode. With the help of this equation explain in detail the V-I characteristics of a semiconductor diode. 5

b Explain effect of temperature on JFET and derive equation for zero temperature drift. 5

c For the circuit shown in fig 1 determine small signal hybrid pi parameters of transistor. 5

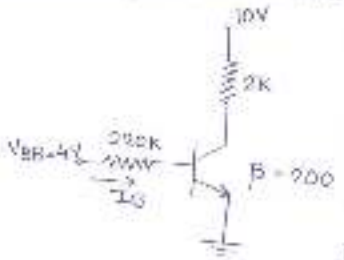

Fig.1

d Design clipper circuit for the output shown in figure.2 Assume diode is ideal.

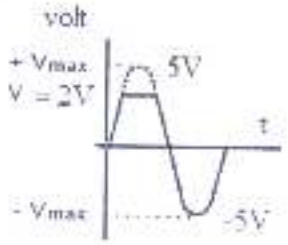

Fig.2

Fig.3

e For the FET shown in figure.3 the drain current equation is $I_{DQ} = 9\left(1 + \frac{V_{GSQ}}{3}\right)^2$ mA. Determine I_{DQ}, V_{GSQ}, V_{DSQ}, V_D. V_{DD}=18V, R_D=2.2kΩ, R_S=1.2KΩ, $-V_{SS}$=-9V and R_G=1MΩ. 5

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Sem III / CBSGS / EXTC / AM III 16/5/2018

Q.P. Code : 13607

(3 Hours) **[Total marks : 80**

Note : -
1) Question number 1 is **compulsory.**
2) Attempt any **three** questions from the remaining **five** questions.
3) **Figures** to the **right** indicate **full** marks.

Q.1 a) Find the Laplace transform of $\cos t \cos 2t \cos 3t$. 05

b) Construct an analytic function whose real part is $e^x \cos y$. 05

c) Find the directional derivative of $\emptyset = x^4 + y^4 + z^4$ at point $A(1, -2, 1)$ in the direction of AB where B is $(2, 6, -1)$. 05

d) Expand $f(x) = lx - x^2,\ 0 < x < l$ in a half-range sine-series. 05

Q.2 a) Find the angle between the normals to the surface $xy = z^2$ at the points $(1, 4, 2), (-3, -3, 3)$. 06

b) Find the Fourier series for 06

$$f(x) = \begin{cases} -c & -a < x < 0 \\ c, & 0 < x < a \end{cases}$$

c) Find the inverse Laplace transform of 08

(i) $\dfrac{4s + 12}{s^2 + 8s + 12}$

(ii) $\log\left(\dfrac{s^2 + a^2}{\sqrt{s + b}}\right)$

Q.3 a) State true or false with proper justification "There does not exists an analytic function whose real part is $x^3 - 3x^2y - y^3$. 06

b) Prove that $J_{5/2}(x) = \sqrt{\dfrac{2}{\pi x}}\left(\dfrac{3 - x^2}{x^2}\sin x - \dfrac{3}{x}\cos x\right)$. 06

c) Expand $f(x) = 4 - x^2$ in the interval $(0, 2)$. 08

Q.4 a) Use Gauss's Divergence theorem to evaluate $\iint_S \bar{N} \cdot \bar{F}\, dS$ where $\bar{F} = 4x\, i + 3y\, j - 2z\, k$ and S is the surface bounded by $x = 0, y = 0, z = 0$ and $2x + 2y + z = 4$. 06

TURN OVER

b) Prove that 06
$\int x^3 \cdot J_0(x)\,dx = x^3 \cdot J_1(x) - 2x^2 \cdot J_2(x).$

c) Solve using Laplace transform $\frac{dy}{dt} + 3y = 2 + e^{-t}$ with 08
$y(0) = 1.$

Q. 5 a) Find Laplace transform of $(1 + 2t - 3t^2 + 4t^3)H(t-2)$ where 06
$$H(t-2) = \begin{cases} 0, & t < 2 \\ 1, & t \geq 2 \end{cases}$$

b) Prove that $2J_0''(x) = J_2(x) - J_0(x)$. 06

c) Obtain complex form of Fourier Series for $f(x) = e^{ax}$ in $(-\pi, \pi)$ 08
where a is not an integer. Hence deduce that when α is a constant other than an integer

$$\sin \alpha x = \frac{\sin \pi\alpha}{i\pi} \sum \frac{(-1)^n n}{(a^2 - n^2)} e^{inx}$$

Q. 6 a) Using Green's theorem evaluate 06
$$\oint_C (e^{x^2} - xy)\,dx - (y^2 - ax)\,dy$$
where C is the circle $x^2 + y^2 = a^2$.

b) Express the function 06
$$f(x) = \begin{cases} 1 & for\ |x| < 1 \\ 0 & for\ |x| > 1 \end{cases}$$
as a Fourier Integral.

c) Under the transformation $w = (1+i)z + (2-i)$, find the region 08
in the w −plane into which the rectangular region bounded by
$x = 0, y = 0, x = 1, y = 2$ in the z −plane is mapped.

XXX XXX

EXTC / III / CBCGS / EDC-I / 16105118

Q.P. Code: 25072

Time: 3 Hours **Marks: 80**

N.B. : (1) Question No. 1 is compulsory.

(2) Solve any three questions from the remaining five

(3) Figures to the right indicate full marks

(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 Attempt any 5 questions **[20]**

a) Prove that for a JFET the gate-source bias for zero temperature drift of drain current is at $|V_p| - 0.63$ volts.

b) Explain the hybrid pi model of BJT.

c) Explain Zener as voltage regulator.

d) Consider a BJT has parameters f_T=500MHz at I_C = 1mA, β = 100 and C_μ = 0.3pF. Calculate bandwidth of f_β and capacitance C_π of a BJT.

e) Draw and explain small-signal model of a diode.

f) Why should R_C be as large as possible in the design of CE amplifier?

Q.2 a) Design a voltage divider bias network using a supply of 24 V, a transistor with β=110 and an operating point of I_{CQ} = 4 mA and V_{CEQ} = 8V. Assume $V_E = \frac{1}{8}V_{CC}$. **[10]**

b) Explain the fabrication steps of passive elements. **[5]**

c) What are the important JFET parameters and define it from characteristics. **[5]**

Q.3 a) Design the resistors of a single stage CS amplifier for audio frequency with BFW11 with $I_{DS} = (3.3 \pm 0.6)$ mA and $|V_p| - 12$. **[10]**

b) Draw CS JFET amplifier with self bias circuit and derive the expression for voltage gain input impedance and output impedance. **[10]**

Q.4 a) Draw small signal hybrid parameter equivalent circuit for CE amplifier and define the same. What are the advantages of h parameters? **[10]**

b) For the circuit shown below in Fig.4b, the transistor parameters are $V_{BE(on)}$ = 0.7 V, β = 200 and $V_A = \infty$. **[10]**

i) Derive the expression for lower cut-off frequency (or time constant) due to input coupling capacitor.

ii) Determine lower cut-off frequency and midband voltage gain.

TURN OVER

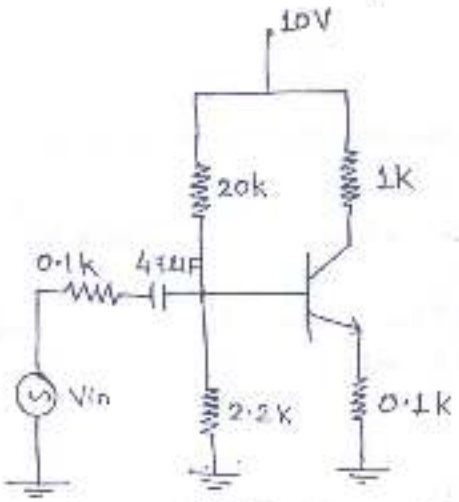

Fig.4b

Q.5 a) Design an L section LC filter with full wave rectifier to meet the following specifications: The DC output voltage V_{dc} = 220 V, deliver I_L = (70 ± 20) mA to the resistive load and the required ripple factor is 0.04. [10]

b) For the circuit shown below in Fig.5b, the transistor parameters are $V_{BE(on)}$ = 0.7 V, β = 100 and V_A = ∞. Determine Z_i, Z_o and Av [10]

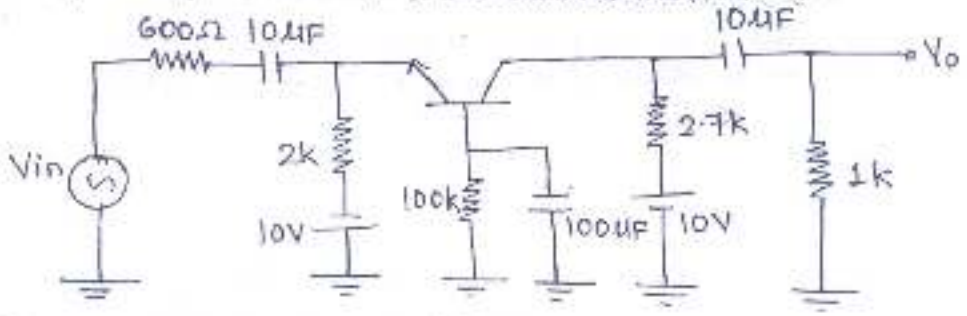

Fig. 5b

Q.6 Short notes on: (Attempt any four) [20]

a) BJT high frequency equivalent circuit
b) Types of resistors and capacitors
c) Stability factors of various biasing techniques of BJT
d) Different types of filters
e) Comparison of BJT CE and JFET CS amplifier

TURN OVER

Transistor type	$P_{d\,max}$ @ 25°C Watts	$I_{C\,max}$ @ 25°C Amps	V_{CE}^{sat} volts d.c.	V_{CB0} volts d.c.	V_{CE0} (Sus) volts d.c.	V_{CER} (Sus) volts d.c.	V_{CEX} volts d.c.	V_{EB0} volts d.c.	T_j max °C	D.C. current gain min.	typ.	max.	Small Signal h_{fe} min.	typ.	max.	V_{BE} max.	θ_{jc} °C/W	Derate above 25°C W/°C
2N 3055	115.5	15.0	1.1	100	60	70	90	7	200	20	50	70	15	50	120	1.8	1.5	0.7
ECN 055	50.0	5.0	1.0	60	50	55	60	5	200	25	50	100	25	75	125	1.5	3.5	0.4
ECN 149	30.0	4.0	1.0	50	40	—	—	8	150	30	50	110	33	60	115	1.2	4.0	0.3
ECN 100	5.0	0.7	0.6	70	60	65	—	6	200	50	90	280	50	90	280	0.9	35	0.03
BC147A	0.25	0.1	0.25	50	45	50	—	6	125	115	180	220	125	220	260	0.9	—	—
2N 525(PNP)	0.225	0.5	0.25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC147B	0.25	0.1	0.25	50	45	50	—	6	125	200	290	450	240	330	500	0.9	—	—

Transistor type	h_{ie}	h_{oe}	h_{re}	θ_{ja}
BC 147A	2.7 K Ω	18 µ℧	1.5×10^{-4}	0.4°C/mW
2N 525 (PNP)	1.4 K Ω	25 µ℧	3.2×10^{-4}	—
BC 147B	4.5 K Ω	30 µ℧	2×10^{-4}	0.4°C/mW
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

$-V_{GS}$ volts	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0	2.4	2.5	3.0	3.5	4.0
I_{DS} max. mA	10	9.0	8.3	7.6	6.8	6.1	5.4	4.2	3.1	2.2	2.0	1.1	0.5	0.0
I_{DS} typ. mA	7.0	6.0	5.4	4.6	4.0	3.3	2.7	1.7	0.8	0.2	0.0	0.0	0.0	0.0
I_{DS} min. mA	4.0	3.0	2.3	1.6	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N-Channel JFET

Type	V_{DS} max. Volts	V_{DG} max. Volts	V_{GS} max. Volts	P_d max. @25°C	T_j max.	I_{DSS}	g_{m0} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 µ℧	6	50 KΩ	2 mW/°C	0.59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 µ℧	2.5	50 KΩ	—	0.59°C/mW

EXTC / III / DE / CBSGS / 22-5-18

Q. P. Code: 35474

(3 Hours) **Total Marks: 80**

N.B. (1) Question No. 1 is **Compulsory**
(2) Out of remaining questions, attempt **any three**
(3) **Assume** suitable data if required
(4) Figures to the right indicate **full marks**

Q.1 **(a)** State and prove De Morgan's Theorems [5]
(b) Compare Combinational and sequential logic Circuits [5]
(c) Define Propagation delay, Power Dissipation, Fan Out, Fan in for TTL family [5]
(d) Explain Programmable Logic Array [5]

Q.2 **(a)** Prove that NAND and NOR Gates are universal Gates [10]
(b) Design a two-bit digital comparator and implement using Gates [10]

Q.3 **(a)** Simplify the logical expressions using Boolean Laws and implement using Gates [10]
$Y_1 = (A + C)(A + D)(B + C)(B + D)$, $Y_2 = (AB + C)(AB + D)$
(b) Implement the given function using 8:1 Multiplexer [10]
$F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 15)$

Q.4 **(a)** Explain the working of universal shift register [10]
(b) Write a VHDL program to design a 4:1 Mux [10]

Q.5 **(a)** Minimize the following expression using Quine McClusky Technique [10]
$F(A,B,C,D) = \sum m(1, 3, 7, 9, 10, 11, 13, 15)$
(b) Convert JK FF to D FF and T FF to D FF [10]

Q.6 **(a)** Design a 3-bit asynchronous counter using JK FF. Draw neat timing diagram [10]
(b) Write a note on CPLDs [10]

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EXTC / III / CBCGS / DSD / 22-5-18

Q. P. Code : 39546

(3 Hours) **80 Marks**

N.B.: (1) Question No. **1 is compulsory.**

(2) Solve any **three questions** from the **remaining five**

(3) Figures to the right indicate full marks

(4) Assume suitable data if necessary and mention the same in answer sheet.

Q.1 a) If $F(A,B,C)=\sum m(0,3,5,7)$ with its truth table and express F in SOP and POS form [20]

b) Compare TTL and CMOS Logic families

c) Perform the following operation using 2's compliment

i) $(7)_{10}-(15)_{10}$

ii) $(50)_{10}-(2A)_{16}$

Comment on results of (i) and (ii)

d) Compare SRAM with DRAM

Q.2 a) Implement following Boolean function using 8:1 multiplexer [10]

$F(A,B,C,D)=\overline{A}\,B\,\overline{D}+A\,C\,D+\overline{B}\,C\,D+\overline{A}\,\overline{C}\,D$

b) Design 3 bit Binary to Gray code Converter [10]

Q.3 a) What are shift registers? How are they classified? Explain working of any one type of shift register. [10]

b) Write VHDL code for 3 bit up counter. [10]

Q.4 a) Explain Master slave JK Flip flop [5]

b). Convert T flip flop to D flip flop. [5]

c) Minimize the following expression using Quine McClusky Technique [10]

$F(A,B,C,D)=\sum m(1,3,7,9,10,11,13,15)$

Q.5 a) State and prove Demorgan's theorem [5]

b) b) Convert $(532.125)_8$ into decimal, binary and hexadecimal. [5]

c) Explain Full Adder circuit using PLA having three inputs, 8 product terms and two outputs. [10]

Q.6 a) Prove that NAND and NOR gates are universal gates [10]

b) Draw and explain 3 bit asynchronous binary counter using positive edge triggered JK flip flop. Draw the waveforms. [10]

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Extc / Sem III / CBSGS / EIC / 11/6/18

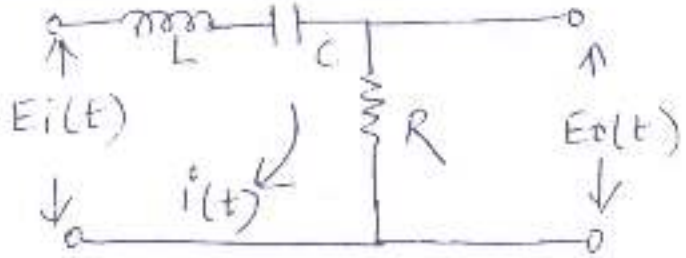
Q.P.Code: 21762

(3 Hours) [Total Marks: 80]

N. B. : (1) Question **No. 1** is **compulsory.**
(2) Attempt any **three** questions from **remaining** questions.
(3) Assume suitable **data** if **necessary**.

Q.1 (a) List name of bridges for RLC measurement with proper classification. 04

Q.1 (b) Find transfer function of given network. 04



Q.1 (c) What is cold junction compensation in thermocouples? 04

Q.1 (d) Draw a block diagram of generalized data acquisition system and explain its components. 04

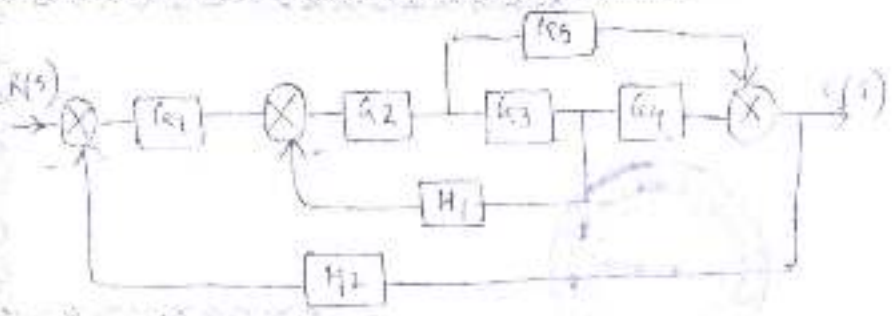
Q.1 (e) Check whether given system is stable 04

$$s6 + 3s5 + 2s4 + 9s3 + 5s2 + 12s + 20 = 0$$

Q.2 (a) Explain Kelvin's double bridge and its application in low resistance measurement. 05

05

(b) Obtain C[s] / R[s] using block diagram reduction technique 10



Q.3 (a) For unity gain system having 10

$$G(s) = \frac{K}{S(S+5)(S+3)}$$

Sketch root locus and comment on stability.

(b) Draw Bode plot for following transfer function is 10

$$G(s)H(s) = \frac{800}{s^2(s+10)(s+40)}$$

And predict stability.

TURN OVER

Q 4 (a) What is multiplexing ?compare FDM with TDM

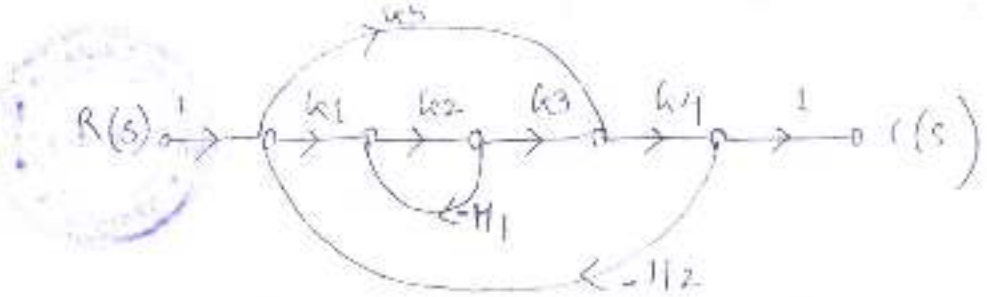
(b) The system has

$$G(S)H(S) = \frac{K}{S(S+2)(S+4)(S+8)}$$

Using Routh criterion find range of K for stability.

(c) Explain working of strain gauge and its application in load measurement.

Q.5 (a) Find C(s)/R(s) using Mason's gain formula



(b) Draw and discuss Hay bridge and its application in measurement of inductance.

Q.6 (a) Explain landline telemetry and discuss about any one landline telemetry system.

(b) For a system with transfer function $\frac{64}{s2+5s+64}$ with unit step input

Find damping ratio, damped frequency of oscillations and time for peak overshoot.

(c) Compare temperature transducers Thermistors and thermocouples on the basis of principle, characteristics, ranges and applications.

(d) Explain how the stability of system is analyzed using Nyquist criteria.

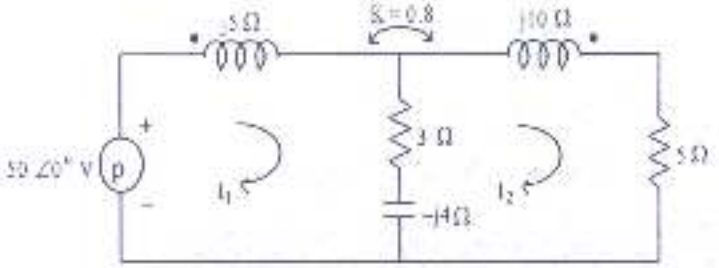
EXTC / Sem III / CBSGS / OCT / 16/18

Q. P. Code: 24590

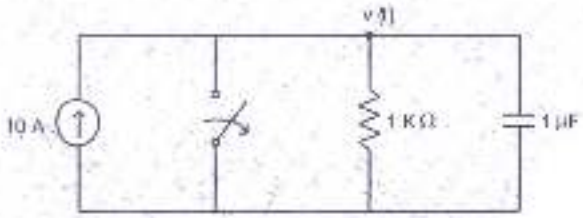
Time: 3 hours | Total Marks: 80

N.B.
1) Question No. 1 is Compulsory
2) Out of remaining questions, attempt any three
3) Assume suitable data if required
4) Figures to the right indicate full marks

1 (A) Draw equivalent circuit for given magnetically coupled circuit. 05



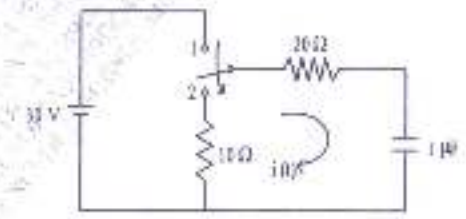
(B) In the given network of Fig., switch is opened at t = 0. Solve for v and $\frac{dv}{dt}$ at t = 0+. 05



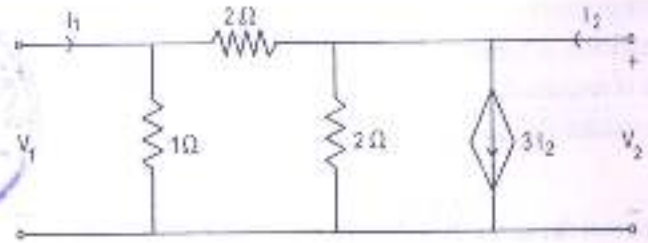
(C) Prove that AD – BC = 1 for Transmission parameters. 05

(D) Define the folowing parameter of transmission lines: 05
i) Input impedance
ii) Charateritics Impedance
iii) VSWR
iv) Reflection Coefficient
v) Transmission Coefficient

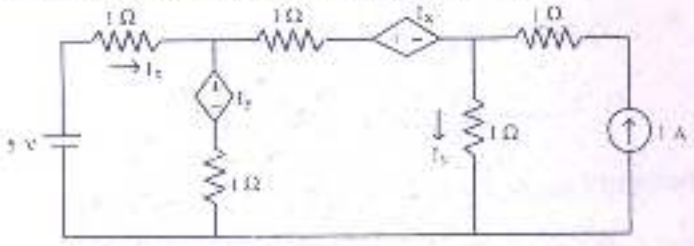
2 (A) In the network shown in Fig., switch is changed from position 1 to position 2 at t = 0, steady condition having reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d2i}{dt2}$ at t = 0+. 10



(B) For the network shown in Fig., find Z and Y-parameters. 10



3 (A) Find currents in the three meshes of network shown in Fig. 10



(B) The parameters of a transmission lines are R = 65Ω/km, L=1.6mH/km, G = 2.25 mmho/km, C=0.1μF/km. Find 10

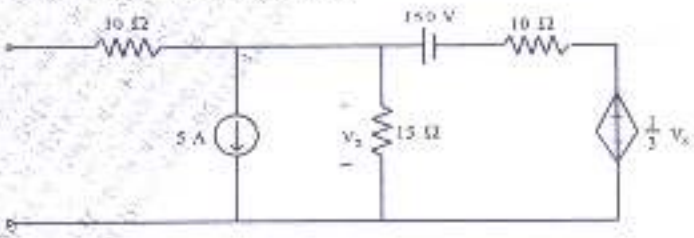
i) Characteristic Impedance
ii) Propagation Constant
iii) Attenuation Constant
iv) Phase Constant at 1 kHz

4 (A) Determine whether following functions are positive real

i) $\dfrac{s^4 + 3s^3 + s^2 + s + 2}{s^3 + s^2 + s + 1}$

ii) $\dfrac{s(s+3)(s+5)}{(s+1)(s+4)}$

(B) Obtain Thevenin equivalent network of Fig.



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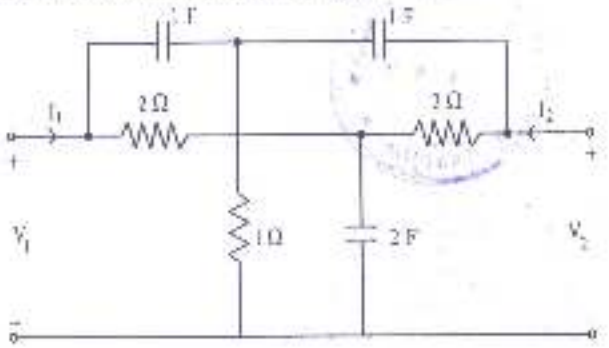
5 (A) Find Y-parameters for the network shown in Fig. 10

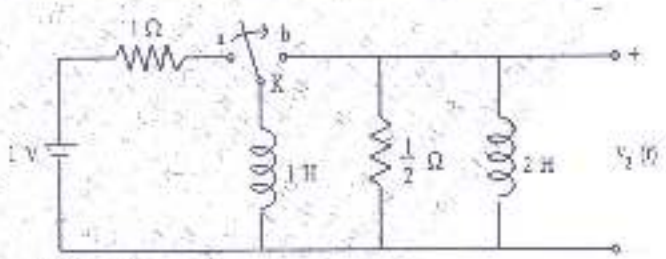


(B) Realize the following functions in Foster II and Cauer I form 10

$$Z(s) = \frac{2(s^2+1)(s^2+9)}{s(s^2+4)}$$

6 (A) A transmission line has a characteristics impedance of 50 ohm and terminate in a load $Z_L = 25 + j50$ ohm. Use smith chart and Find VSWR and Reflection coefficient at the load. 10

(B) In the network of Fig. switch is in position 'a' for a long time. At t = 0 switch is moved from a to b. Find $v_2(t)$. Assume that the initial current in 2 H inductor is zero. 10



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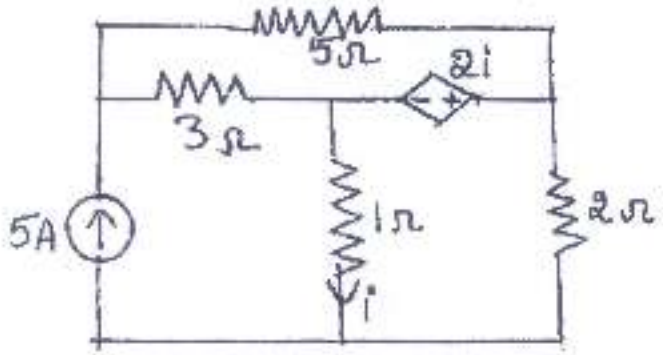
EXTC/SemIII/CBCGS/CTN/2/6/12

QP Code : 24948

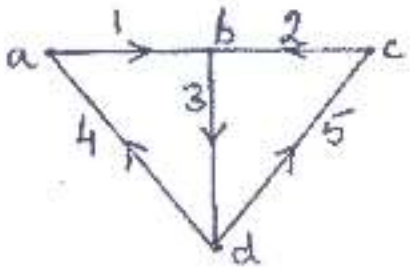
[3 Hours] [Total Marks : -80]

N.B : 1. Question No. 1 is compulsory.
2. Attempt any three from the remaining questions.

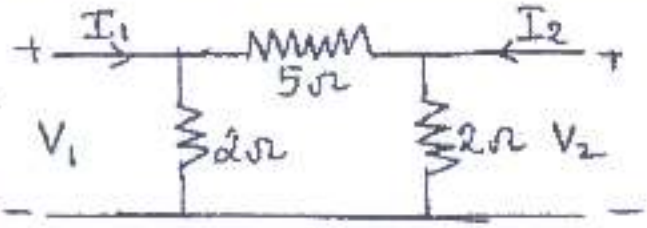
1. (a) Find the voltage drop across 5Ω resistor in the circuit given below. 5



(b) For the graph given below obtain the incidence matrix and find the number of possible trees. 5

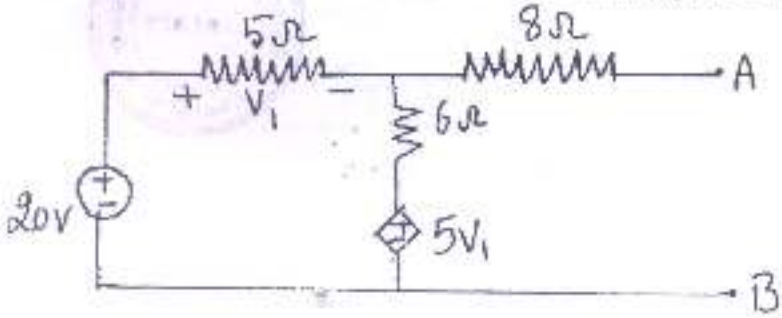


(c) Find y parameters for the two-port network shown in figure. 5



(d) Check whether the following polynomials are Hurwitz 5
(i) $P(s) = S^4 + 7S^3 + 6S^2 - 21S + 8$
(ii) $P(s) = S^5 + 2S^3 + S$

(a) Find the Thevenin's equivalent across AB and find the power dissipated in a 25Ω load. 10



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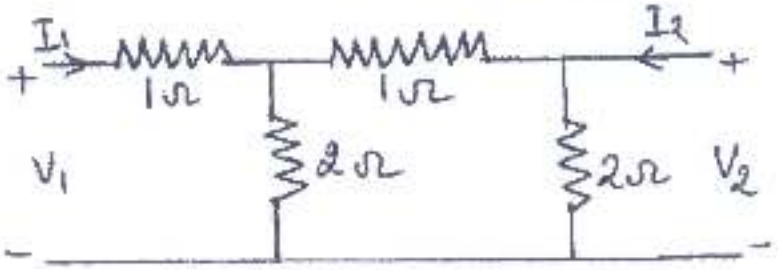
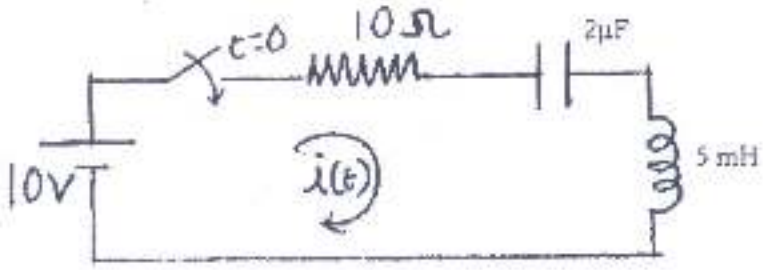
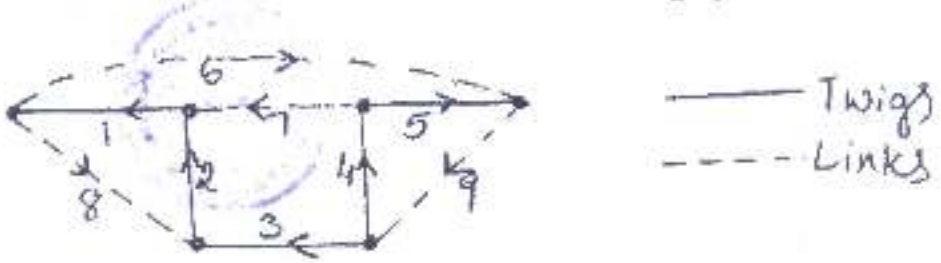
(b) Find h parameters for the following Two-port network.



(c) In the network shown below the switch is closed at t = 0. Assuming all initial conditions to be zero, find i, di/dt, d^2i/dt^2 for $t = 0^+$.



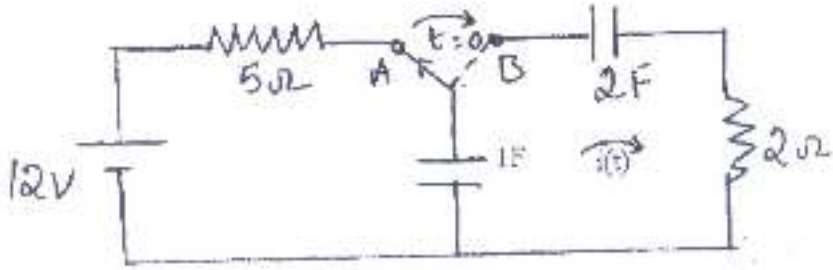
3. (a) Find the tie-set and f-cutset matrix for the oriented graph shown below. 10



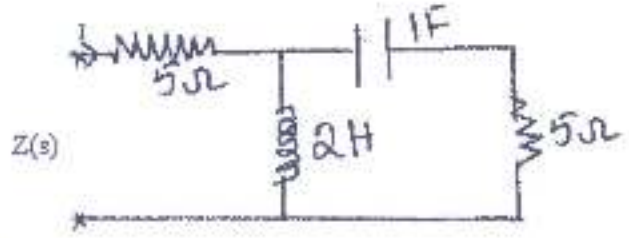
(b) Realize the following function in Foster I and Foster – II forms. 10

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

4. (a) A switch is in position A for a long time and then thrown to position B at t = 0. Find i(t) for > 0. At what value of 't' the current i(t) will become half of current at t =0 10

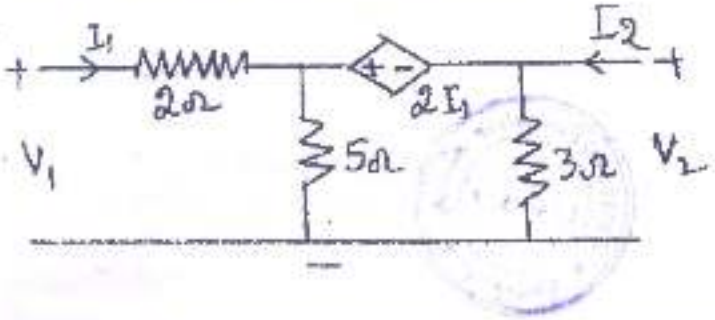


(b) For the following network find the driving point impedance function. 5



(c) Find the condition for symmetry and reciprocity for a two port network using any one parameter. 5

5. (a) Obtain the ABCD parameters of the following network. If two such networks are cascaded find the overall ABCD parameter. 10



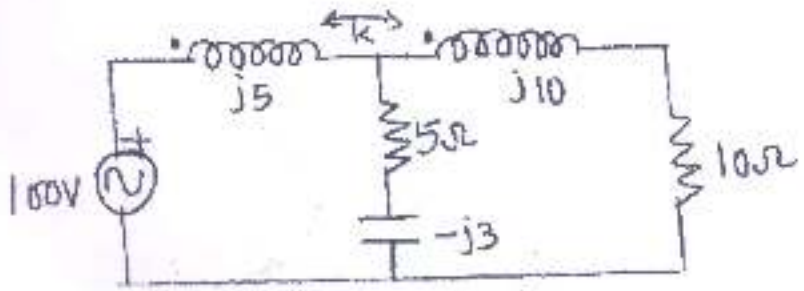
(b) Check whether the following function if positive real or not. 5

$$F(s) = \frac{(S^2 + 6S + 5)}{(S^2 + 9S + 14)}$$

(c) Find the oriented graph if the incidence matrix of the network is as given below. 5

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

(a) Find the mesh currents if the coupling factor k = 0·6 10



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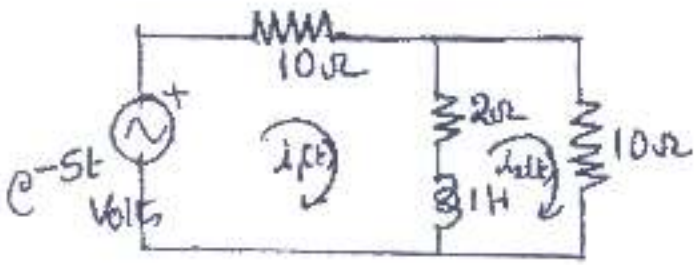
(b) Find $i_2(t)$ using Laplace transform. 10



EXTC / sem III / CBSGS / EIM / 21618

Q.P.Code: 21759

(3 Hours) **[Total Marks: 80]**

Instructions – i) Questions 1is Compulsory
ii) Out of remaining questions attempt any three questions
Iii) Assume suitable additional data if required.bridge
iv)Figures in the bracket to the right hand side indicate full marks.

Q.1	a)	Compare analog instrument with digital instrument.	(05)
	b)	Explain selection criteria for transducers.	(05)
	c)	Which is fastest ADC and why?	(05)
	d)	Describe the various types of sweeps used in CRO.	(05)
Q.2	a)	Explain working of LVDT and define its application in displacement measurement.	(10)
Q.2	b)	Draw neat block diagram of Dual Beam oscilloscope. Give the comparison between Dual Trace and Dual Beam Oscilloscope.	(10)
Q.3	a)	Draw and explain Hay bridge and its application for measurement of inductances.	(10)
Q.3	b)	Explain principle of operation and working of dual slope DVM.	(10)
Q.4	a)	Define power and energy and explain working of a single phase energy meter.	(10)
Q.4	b)	Draw and explain capacitive transducer for level measurement	(10)
Q.5	a)	Draw the block diagram of generalised measurement system and explain its component	(10)
Q.5	b)	Draw andexplain Wheatstone bridge and drive expression for measurement of resistance.	(10)
Q.6	a)	Explain dual slope ADC with neat block diagram and comment on its speed	(10)
Q.6	b)	Define Q factor and explain working of a Q meter for Q factor measurement.	(10)