EXTC (Old) Nov-Dec-15

SE sem AM-III Dec-2015

20/11/15

EXTC Sub:- AM-III

QP Code : **1078**

(3 Hours) [Total Marks : 100

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

1. (a) Show that every square matrix can be uniquely expressed as the sum of Hermitian and Skew-Hermitian matrix. 5
(b) If $\{f(k)\} = 4^k$ for $k<0$; $\{f(k)\} = 3^k$ if $K \geq 0$ then find $Z\{f(k)\}$ 5
(c) Obtain complex form of fourier series for $f(x) = \cosh 3x + \sinh 3x$ in $(-3, 3)$ 5
(d) Find the Laplace Transformation of the function $\sqrt{1+\sin 2t}$ 5

2. (a) Find Laplace transform of $\frac{\cos at - \cos bt}{t}$ 6

(b) Reduce $A = \begin{bmatrix} 1 & -1 & -2 & -3 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 1 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ in to normal form hence find rank of A 6

(c) Find the Fourier expansion for $f(x) = x\sin(x)$ in $(0, 2\pi)$ 8

3. (a) Test for consistency and solve 6
$2x - y + z = 9, 3x - y + z = 6, 4x - y + 2z = 6, -x + y - z = 4$

(b) Find the Half Range Sine series for $f(x) = x \sin x$ in $(0, \pi)$ 6

(c) Find inverse z-transform of $f(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}, 2 < z < 4$ 8

4. (a) Find z- transform of $2^k \cos(3k + 2), k \geq 0$ 6
(b) Find the Fourier expansion for $f(x) = \sqrt{1-\cos(x)}$ in $(0, 2\pi)$ 6

(c) Solve Using Laplace transform $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 20 \sin 2t$ where 8
$y(0) = 1, y'(0) = 0$

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5. (a) Find fourier integral representation for
$f(x) = x, 0 < x < a$
$= 0, x > a$

(b) Find the two non -singular matrices P and Q such that PAQ is in normal form where $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ and also find its rank.

(c) Obtain fourier series for $f(x) = x(\pi - x)\ 0 < x < \pi$ as a half range cosine series and hence show that $\sum_{n=1}^{\infty} \frac{1}{n^4} = \frac{\pi^4}{90}$

6. (a) Using Laplace transform evaluate $\int_0^{\infty} (1 + 2t - 3t^2 + 4t^3) H(t-2) dt$

(b) Show that the set of functions $\sin(2n+1)x$, $n = 0, 1, 2, \ldots$ is orthogonal over $\left[0, \frac{\pi}{2}\right]$ Hence construct orthonormal set of functions.

(c) Find inverse Laplace transform of the following

(i) $\frac{1}{s}\log\left(1 + \frac{1}{s^2}\right)$ (ii) $\frac{e^{4-3s}}{(s+4)^{5/2}}$

7. (a) Find inverse Laplace transform of $\frac{(s+2)^2}{(s^2+4s+8)^2}$ by convolution theorem

(b) If $N = \begin{bmatrix} 0 & 1+2i \\ -1+2i & 0 \end{bmatrix}$ then show that $(I - N)(I + N)^{-1}$ is a unitary matrix.

(c) Obtain fourier series for $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & -\pi \le x \le 0 \\ 1 - \frac{2x}{\pi} & -0 \le x \le \pi \end{cases}$

nce deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots$

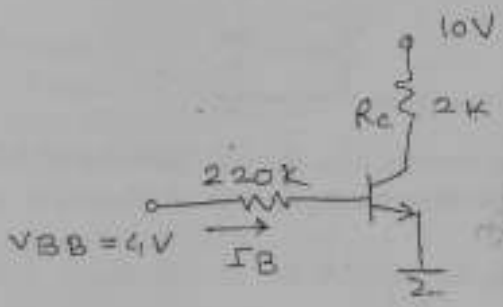
AE-I (EXTC) Nov-Dec-15
Dec-2015 CBGS Sem-III
se sem III Date:- 20/11/15
EXTC 20/11/15
Sub:- AE-I

Q.P. Code : **5079**

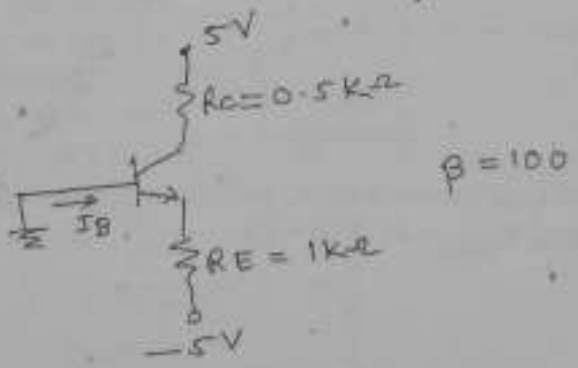
(3 Hours) [Total Marks : 80

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **three** questions out of the remaining **five** questions.
(3) Assume suitable **data** wherever **required**.

1. Attempt any **four**. 20
   (a) Draw Input and Output characteristics of BJT in common emitter configuration.
   (b) Draw small signal hybrid π equivalent circuit for npn transistor.
   (c) Explain effect of temperature on JFET and derive equation for zero current drift.
   (d) Calculate I_B, I_C & V_{CE} for common emitter circuit.



   (e) Find I_B, I_C & V_{CE} for following circuit.



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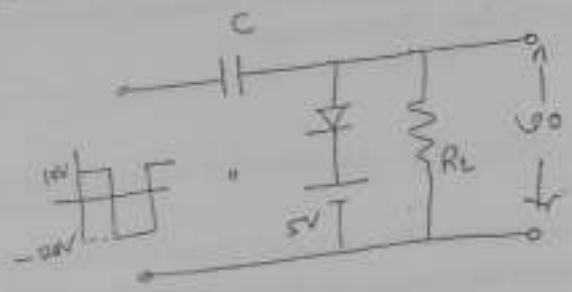
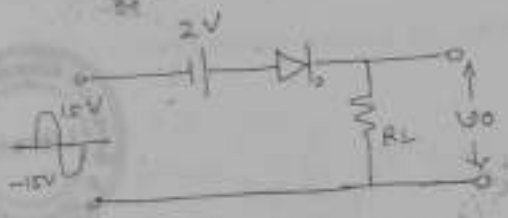
2. (a) Draw output waveform for clamper and clipper circuits. 10

(i)

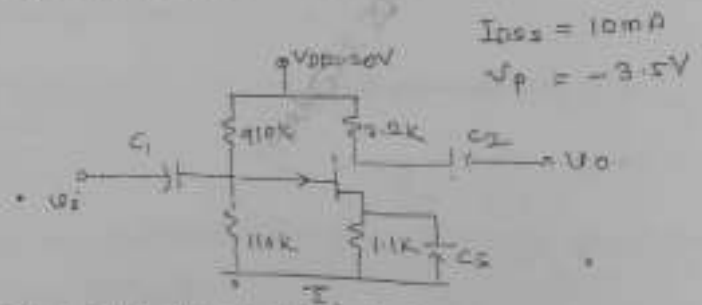


(ii)

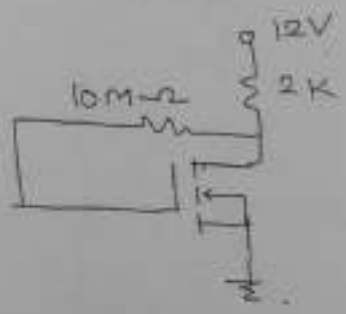


(b) Explain construction & characteristics of n channel Ehancement MOSFET. Draw transfer characteristics & drain characteristics. 10

3. (a) For JFET amplifier shown below, Calculate Av, Zi, Zo 10



(b) For the circuit shown below, calculate I_{DQ} & V_{DSQ}. It is given that $I_{D(ON)}$ = 6 mA, $V_{GS(ON)}$ = 8V. Vth = 3V 10



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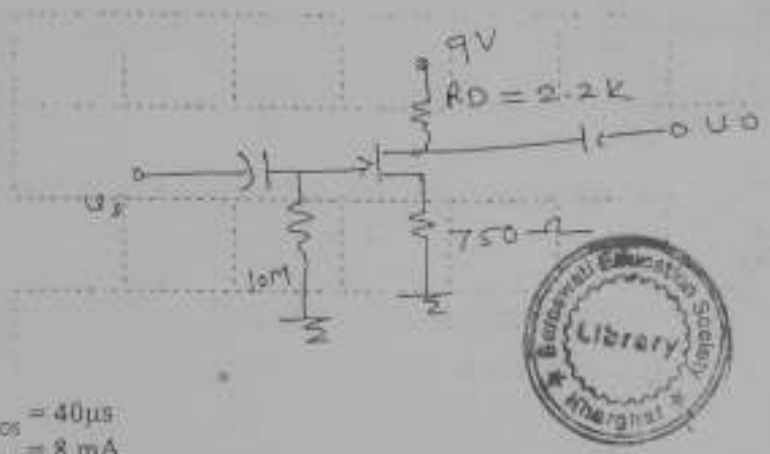
4. (a) Explain the working of Wein Bridge Oscillator. Derive the expression for frequency of oscillation for sustained oscillations. 10

(b) Calculate voltage gain of FET amplifier 10



$Y_{os} = 40\mu s$
$I_{DSS} = 8$ mA
V_{GS} off = -4V

5. (a) Draw & explain energy band diagram of MOS capacitor operating in 10
   (i) Accumulation
   (ii) Depletion
   (iii) Inversion mode

(b) Draw emitter follower circuit and derive an expression for voltage gain Av. 10

6. (a) Draw circuit diagram for phase shift oscillator & derive an expression for frequency of oscillation. 10

(b) Write short notes on any two. 10
   (i) Photodiodes
   (ii) LC oscillators
   (iii) Transistor as a switch
   (iv) Schottky diode.

AM-III (Sem III) Comp EXTC 27-11-15
27/11/15 CBGS
Sub: AM-III
EXTC

QP Code : 5106

(Revised course)

Time :3 hours Total marks :80

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

1. (a) Evaluate $\int_0^{\infty} e^{-t}\left(\frac{\cos 3t - \cos 2t}{t}\right)dt$ 05

(b) Obtain the Fourier Series expression for $f(x) = 2x - 1$ in $(0,3)$ 05

(c) Find the value of 'p' such that the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{py}{x}\right)$ is analytic. 05

(d) If $\vec{F} = (y\sin z - \sin x)\hat{i} + (x\sin z + 2yz)\hat{j} + (xy\cos z + y^2)\hat{k}$.
Show that $\vec{F}$ is irrotational .Also find its scalar potential. 05

2. (a) Solve the differential equation using Laplace Transform 06

$\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 3te^{-t}$, given $y(0)=4$ and $y'(0)=2$

(b) Prove that 06

$J_4(x) = \left(\frac{48}{x^3} - \frac{8}{x}\right)J_1(x) - \left(\frac{24}{x^2} - 1\right)J_0(x)$

(c) i) In what direction is the directional derivative of $\phi = x^2y^2z^2$ at $(3,-1,-2)$ maximum. Find its magnitude. 08
ii) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$
Prove that $\nabla r^n = nr^{n-1}\vec{r}$

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3. (a) Obtain the Fourier Series expansion for the function 06

$$f(x) = 1 + \frac{2x}{\pi}, -\pi \le x \le 0$$

$$= 1 - \frac{2x}{\pi}, 0 \le x \le \pi$$

(b) Find an analytic function f(z) =u+iv where. 06

$$u - v = \frac{x - y}{x^2 + 4xy + y^2}$$

(c) Find Laplace transform of 08

i) $\cosh t \int_0^t e^u \sinh u$

ii) $t\sqrt{1+\sin t}$

4. (a) Obtain the complex form of Fourier series for 06
$f(x) = e^{ax}$ in (-L,L)

(b) Prove that 06
$\int x^4 J_1(x)dx = x^4 J_4(x) - 2x^3 J_3(x) + c$

(c) Find 08

i) $L^{-1}\left[\frac{2s-1}{s^2+4s+29}\right]$

ii) $L^{-1}\left[\cot^{-1}\left(\frac{s+3}{2}\right)\right]$

5. (a) Find the Bi- linear Transformation which maps the points 06
1,i,-1 of z plane onto 0,1,∞ of w-plane

(b) Using Convolution theorem find 06

$L^{-1}\left[\frac{s^2}{(s^2+4)^2}\right]$

(c) Verify Green's Theorem for $\int_C \bar{F}.d\bar{r}$ where $\bar{F}=(x^2-y^2)\hat{i}+(x+y)\hat{j}$ and C is the triangle with vertices (0,0) ,(1,1) and (2,1) 08

6. (a) Obtain half range sine series for $f(x)=x, 0\le x\le 2$ $=4-x, 2\le x\le 4$ 06

(b) Prove that the transformation $w=\frac{1}{z+i}$ transforms the real axis of the z-plane into a circle in the w-plane. 06

(c) i) Use Stoke's Theorem to evaluate $\int_C \bar{F}.d\bar{r}$ where $\bar{F}=(x^2-y^2)\hat{i}+2xy\hat{j}$ and C is the rectangle in the plane z=0,bounded by x=0,y=0,x=a and y=b. 08

ii) Use Gauss Divergence Theorem to evaluate $\iint_S \bar{F}.\hat{n}ds$ where $\bar{F}=4x\hat{i}+3y\hat{j}-2z\hat{k}$ and S is the surface bounded by x=0,y=0,z=0 and 2x+2y+z=4

EDC-I (Sem III. EXTC (OLD))
SE sem - III
27/11/15
27-11-15
EXTC
Sub! - EDC-I

Q.P. Code : 1121

(Old Course)
(3 Hours)

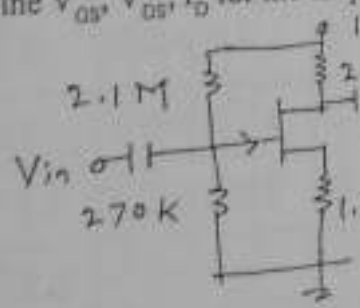
[Total Marks : 100

N.B. : (1) Question No.1 is compulsory.
(2) Attempt any four questions from the remaining six questions.
(3) Figure to the right indicates full marks.
(4) Assume suitable data whenever necessary and mention the same.

1. Using BC 147 A transistor design single stage RC coupled BJT amplifer for following specifications Av = 100, V_o = 3 Volts, f_L = 10 Hz, S < 10. For the designed amplifier determine input and output impedances ,voltage gain. State any two applications of this amplifier. 20

2. (a) Derive the expressions of voltage gain ,input impedance, output impedance for CS amplifier using JFET. 10

(b) Determine V_{GS}, V_{DS}, I_D for the amplifier shown below : 10

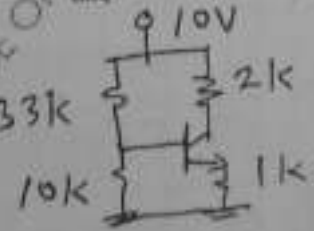


3. (a) Derive the expressions of Voltage gain, current gain ,input impedance and output impedance for CB AMPLIFIER. 10

(b) Explain different biasing methods used for D MOSFET and E MOSFET. 10

4. (a) Draw the circuit diagram and explain the operation of Bridge rectifier with capacitor filter. Draw neat waveforms for current and voltage across load and diode.State application of this rectifier. 10

(b) Find I_{BQ}, I_{CQ} and V_{CEQ} for the following circuit. Draw DC load line. 10



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SE SEM III (EBGS) (EXTC) : (DE) NOV-DEC-15

03/12/15

3/12/15

EXTC Sub:- DE

QP Code : 5174

(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) Compare SRAM and DRAM [5]
(b) Compare Mealy and Moore machine [5]
(c) Compare TTL and CMOS Logic [5]
(d) Design a full adder using 3:8 decoder [5]

2. (a) State and Prove DeMorgan's Laws [10]
(b) Explain carry look ahead adder. What is its advantage over a simple adder [10]

3. (a) Design a 4 bit Grey to Binary code converter [10]
(b) Implement the given function using 8:1 Multiplexer [10]
$F(A, B, C, D) = \sum m(0,1,4,5,6,8,10,12,13)$

4. (a) Explain the working of Bidirectional Shift register with proper timing diagram [10]
(b) Write a VHDL program to design a 1:8 Demux using Data flow modeling [10]

5. (a) Minimize the following expression using Quine McClusky Technique [10]
$F(A,B,C,D) = \sum m(1,2,5,7,9,15) + d(0,3,11)$
(b) Convert D FF to T FF and SR FF to JK FF [10]

6. (a) Design synchronous counter to count the sequence 0-1-2-3-4-5-0 [10]
(b) Compare PAL with PLA with suitable examples of logic expressions [10]

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EI/EXTC (old)/Sem III (old)/09/12/15

Nov. Dec-15

EXTC Sub:- EI

(OLD COURSE) QP Code : **1201**

(Hours 3) [Total Marks : 100

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

1. (a) Explain universal counter in detail. 20
(b) Draw and explain bounded strain guage.
(c) Compare ASK and PSK
(d) Explain RTD in detail.

2. (a) Explain capactive sensor with advantages and disadvantages 10
(b) Explain Bounded tpe strain guage with application 10

3. (a) Explain in detail significance of $3\frac{1}{2}$ and $4\frac{1}{2}$ digit 10
(b) Draw and explain Block diagram of DSO with std features. 10

4. (a) Explain Network analyzer in detail. 10
(b) Draw and explain any two types of telemertery 10

5. (a) What is ASK? Explain with the help of suitable wave form 10
(b) Draw and explain digial frequency meter. 10

6. (a) Describe FFT analyzer with advantages. 10
(b) List different applications of DSO in communication. Explain any one. 10

7. Write short note on (any **four**): 20
(a) Data logger
(b) Sweep mode
(c) Q meter
(d) Total harmonic distruction
(e) Refresh and sampling mode.

EI&M / Sem III / EXTC / CBGS / 09/12/15

EXTC Sub:- EI & M Nov-Dec-15

QP Code : 5223

Time: 3 Hours

MM: 80 Marks

Note: 1. Attempt four questions, question no 1 is compulsory.
2. Assume suitable data where ever required.
3. Answers to the questions should be grouped together.
4. Figure to the right of question indicates full marks.

Q1) Attempt any four: (20)

a) Significance of four and half digit display
b) Discuss Megger for measurement of very high resistance.
c) Explain working of strain gauge and its application in load measurement
d) Explain working of thermocouple and mention its range
e) Explain error in measurement and methods of error minimization
f) A galvanometer, with a 1 mA full scale deflection and an internal resistance of 500 Ω, is to be used as voltmeter, find series resistance for 1v and 10 v ranges.

Q2 a) Draw and explain working of capacitive transducer for level measurement. (10)
b) Draw neat block diagram of CRO and explain its functioning, comment on role of delay line in CRO. (10)

Q3 a) Discuss DSO with the help of block diagram along with various modes of operation also explain its applications. (10)
b) Explain LVDT and define its application in displacement measurement. (10)

Q4 a) Explain Hetrodyne type waves analyser and its applications. (10)
b) Draw and explain Weighted resistor network type DAC for 3 bits input taking suitable example. (10)

Q5 a) Draw and explain Schering bridge and drive expression for measurement of capacitance. (10)
b) Define power and Energy and explain working of a single phase energy meter. (10)

Q6 a) Draw and explain Wheatstone bridge and drive expression for measurement of resistance. (10)
b) Explain Flash type 3 bit ADC with the help of block diagram and comment on its speed. (10)

SEM-III Sub: C&TL EXTC 4-pages
Date. 16/12/15
Nov-Dec-15

EXTC Sub:-C&TL

QP Code : 5262

(3 Hours) [Total Marks : 80

N. B. : (1) Attempt question 1 and any three from remaining question.
(2) All sub questions of the same question should be answered at one place only in their serial orders and not scattered.
(3) Write every thing in inkonly. Pencil is not allowed.
(4) Assume suitable data with justification if missing.

1. (a) Determine the ABCD parameter of the network shown in fig. No. 1(a) 5

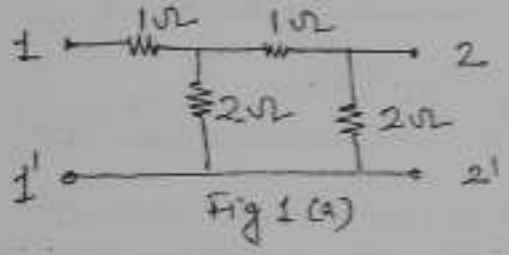

Fig 1 (a)

(b) Test whether $P(s) = S^5 + 12S^4 + 45S^3 + 60S^2 + 44S + 48$ is Hurwitz polynomial. 5

(c) The combined inductance of two coils connected in series is 0.6 H or 0.1 H depending on relative directions of currents in the two coils. If one of the coils has a self inductance of 0.2 H. Find (a) Mutual inductance (b) Coefficient of coupling. 5

(d) Find Foster I and II and Cauer I and II Circuits for the driving point admittance 5

$$y(s) = \frac{S^2 + 1}{S}$$

2. (a) Find the current in the 10Ω resistor using Thevenin's theorem for the network shown in fig. 2(a) 10

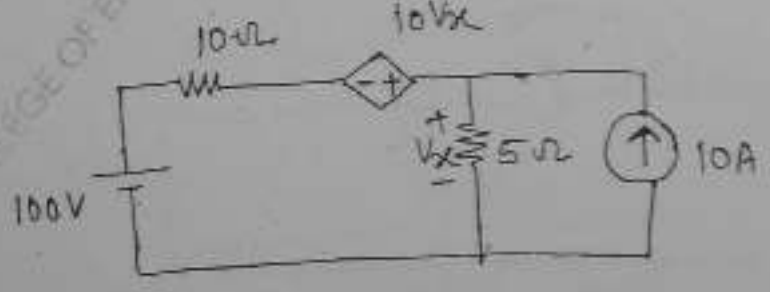

Fig. 2(a)

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(b) Find the value of Vx in the network shown in fig 2(b) using nodal analysis. 5

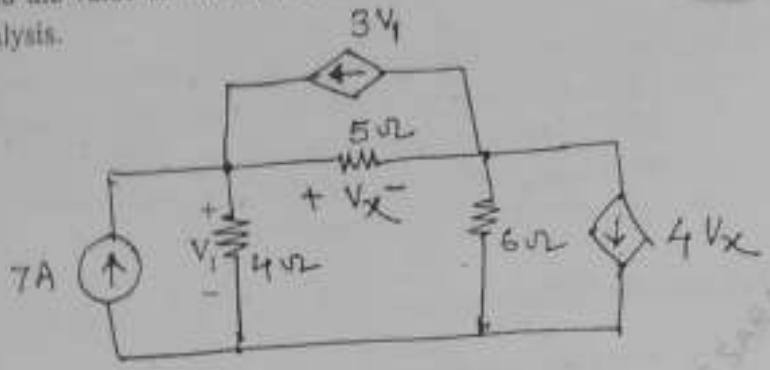

Fig 2 (b)

(c) Check if the following polynomials are Hurwitz polynomials 5

(i) $S^5 + S^3 + S$

(ii) $S^4 + S^3 + 2S^2 + 3S + 2$

3. (a) Synthesize the driving point function 10

$$F(s)=\frac{(S^2+1)(S^2+3)}{S(S^2+2)}$$ when F(s) is a driving point (i) Impedence (ii) Admittance

Test if the circuit obtained are canonic.

(b) State and prove initial value theorem. 5

(c) The parameters of a transmissionlines are R = 6Ω/km, L = 2.2 mH/km G = 0.25×10^{-6} ℧/km, C = 0.005×10^{-6} F/km. Determine the characteristics impedence and propagation constant at a frequency of 1 GHz. 5

4. (a) Determine z and y parameters of the network shown in fig 4(a). 10

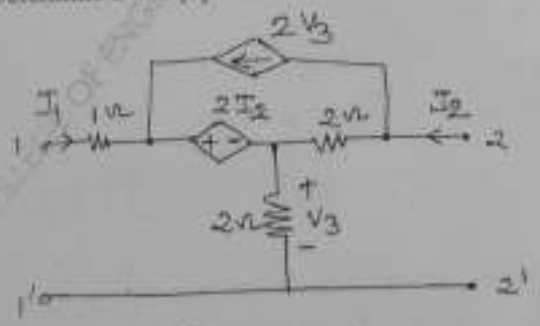

fig 4 (a)

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(b) Determine the voltage transfer function $\frac{V_2}{V_1}$ for the network shown in fig. 4(b). 5

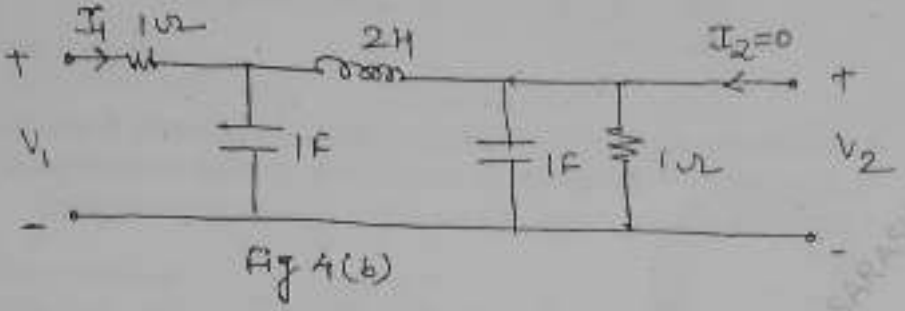


Fig 4(b)

(c) Test whether $F(s)=\frac{2S^3+2S^2+3S+2}{S^2+1}$ is a positive Real Function. 5

5. (a) The network shown in fig 5(a), a steady state is reached with the switch open. At t=0 the switch is closed. Determine $V_C(0^-)$, $i_1(0^+)$ $i_2(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{di_2}{dt}(0^+)$ 10

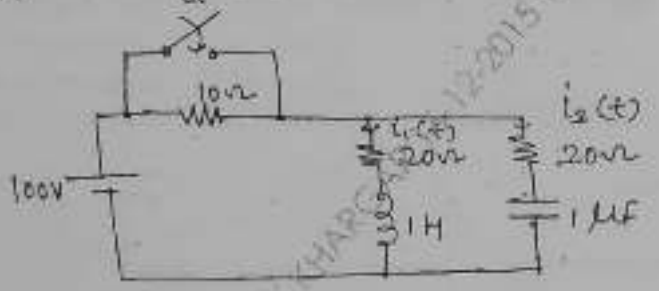


Fig 5 (a)

(b) Find the voltage across the 5Ω resistor in network shown in fig. 5(b). 5

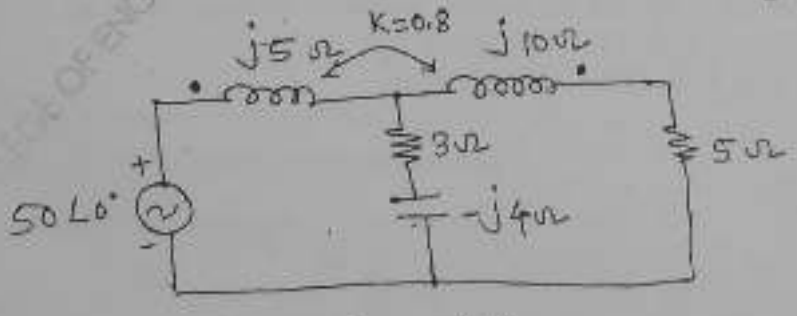


Fig 5 (b)

(c) Find the function v(t) using the pole-zero plot of the following function. 5

$$V(s) = \frac{(S+2)\ (S+6)}{(S+1)\ (S+5)}$$

6. (a) A unit impulse applied to two terminal black box produces a voltage $V_0(t) = 2e^{-t} - e^{-3t}$. Determine the terminal voltage when a current pulse of 1A height and a duration of 2 seconds is applied at the terminal. 10

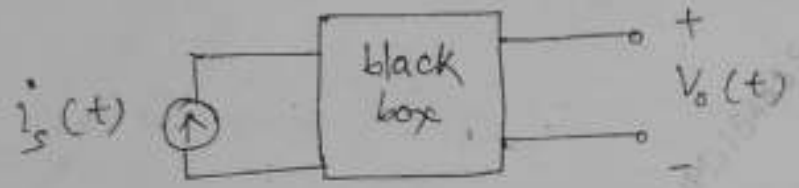


Fig 6.(a)

(b) Determine the driving point impedence of the network shown in fig. 6(b) 5

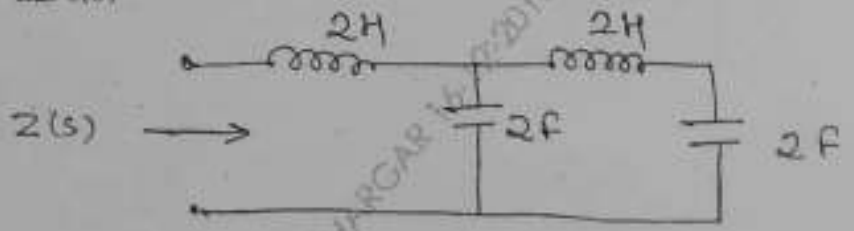


Fig 6 (b)

(c) Draw the following normalized quantities on the smith chart. 5

(i) $(2 + j2)\ \Omega$ (ii) $(4 - j2)\ \Omega$

(iii) $(1.0)\ \Omega$ (iv) $(j1.0)\ \Omega$

EXTC(OLD) NOV/DEC 2015 /21/1/15 (8)

SE SEM-III (OLD) NOV-DEC-15 EN(OLD)

EXTC Sub:- EN

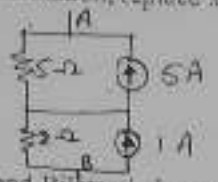
(OLD COURSE)
(3 Hours)

QP Code: 1264
[Total Marks: 100]

N.B. : (1) Question No. 1 is **compulsory.**
(2) Attempt any **four** from the **remaining** questions.
(3) **Assume** suitable **data**, if **required.**

Q.1 Attempt any four (20)

(1) Using source transformation, replace the network with a single current source and a resistor.



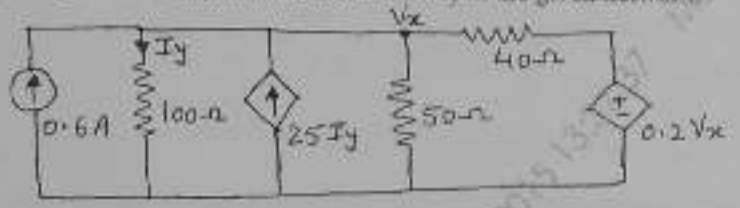
(2) Define Unilateral and Bilateral element.

(3) Define final steady state condition for resistor and capacitor.

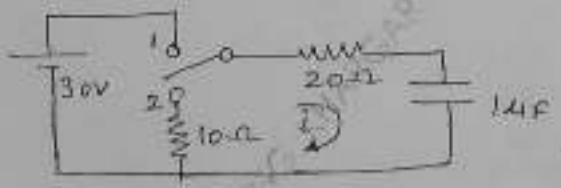
(4) Obtain condition for reciprocity for Z parameters.

(5) Draw pole zero plot for $= S(S+1)/(S+3)(S+2)^2$

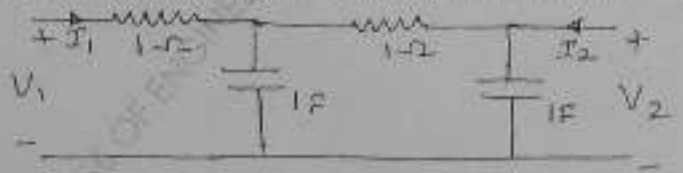
Q. 2 (a) Using nodal analysis calculate current I_x in the given network. (10)



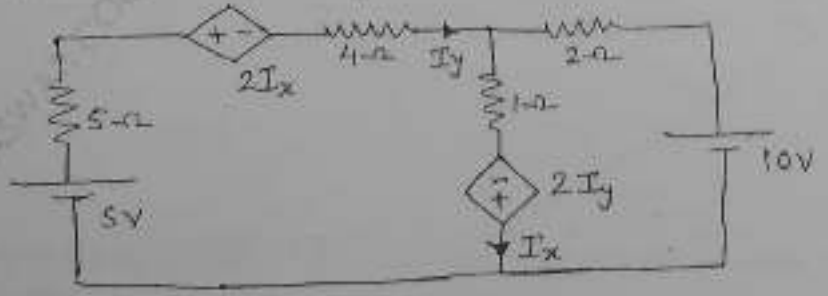
(b) In the given network switch initially is at position 1, and attains steady state condition. At $t = 0$, it is moved from position 1 to position 2, find the value of (i, di/dt and d^2i/dt^2) at $t > 0^+$. (10)



Q. 3 (a) Find the network functions V_1/I_1, V_2/I_1 and V_2/V_1. (10)



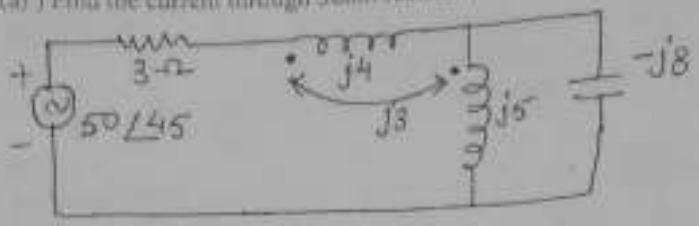
(b) Calculate I_x and I_y for the given network (10)



QP-Con. 12207-15.

Turn over

Q.4 (a)) Find the current through 3ohm resistor. (10)

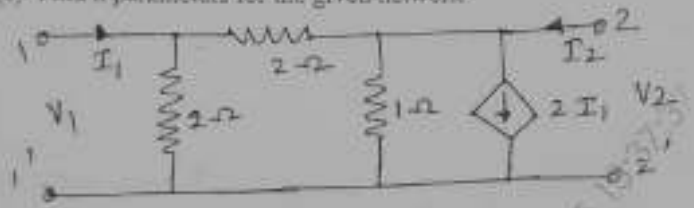


(b) Realise the function using Cauer I and Cauer II (10)
$Z(s) = (10S^4 + 12S^2 + 1) / (2S^3 + 2S)$

Q. 5(a) Test the function is PRF or not (05)
$F(s) = (S^3 + 6S^2 + 7S + 3) / (S^2 + 2S + 1)$

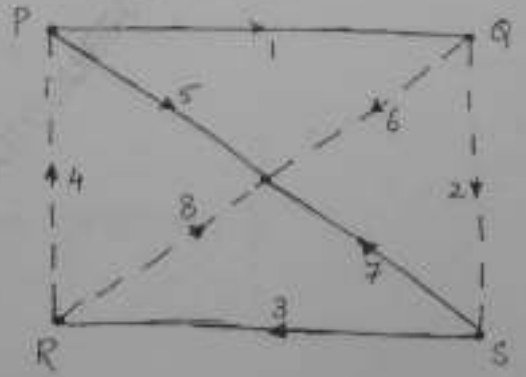
(b) Test whether the polynomials are Hurwitz or (05)
(1) $P(s) = 2S^4 + 5S^3 + 5S^2 + 4S + 10$
(2) $P(s) = S^3 + S^2 + S$

(c) Find h parameters for the given network (10)

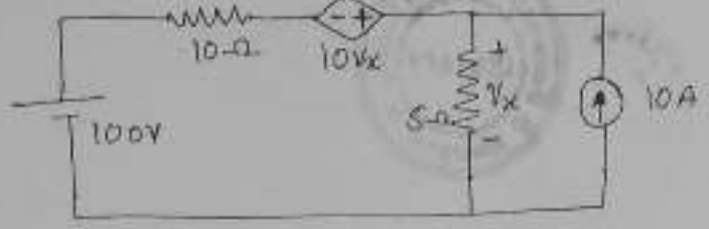


Q.6 (a) Find the driving point admittance Y(s) for the network shown and plot the pole-zero plot. (10)

(b) For the given tree obtain (10)
(1) Incidence matrix
(2) Fundamental cutset matrix
(3) Fundamental tieset matrix



Q.7(a) Find the current in 10 ohm resistor of the network, using thevenin's theorem. (10)



(b) Find the current i(t) through R in the circuit shown below using Laplace transform. (10)