Ref III-EXTC New

Paper / Subject Code: 51201 / Applied Mathematics-III

S.E/EXTC/Sem III/Choicebased/08.05.19

(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 $L[(\sin 2t - \cos 2t)^2]$ [5]

b) Determine the constants a, b, c, d so that the function $f(z) = x^2 + axy + by^2 + i(cx^2 + dxy + y^2)$ is analytic [5]

c) If $\phi = 3x^2y - y^3z^2$ find $\nabla\phi$ at the point P (1,-2,-1) [5]

d) Obtain half range sine series for f (x) = x^2 in 0 < x < 3 [5]

Q 2. a)Construct analytic function whose real part is $e^x \cos y$ [6]

b) Find the Fourier series for $f(x) = |x|$ in $(-2, 2)$. [6]

c) Find the Laplace transform of the following

i) $L[t\sqrt{1+\sin t}]$ ii) $L\left\{\frac{\sin t \sin 5t}{t}\right\}$ [8]

Q 3. a) Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}}\sin x$ [6]

b) Evaluate inverse Laplace transform using Convolution Theorem $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$ [6]

c) Show that the vector field $\bar{F} = (2xy + z^3)\,\hat{i} + x^2\,\hat{j} + (3xz^2 + 2z)\,\hat{k}$ is conservative and find $\phi(x, y, z)$ such that $\bar{F} = \nabla\phi$. [8]

Q 4 a)Find bilinear transformation which maps the points z=0,i,-2i of z plane onto the points $w = -4i, \infty, 0$ of w plane [6]

b) Prove that $f_1(x) = 1, f_2(x) = x, f_3(x) = \frac{3x^2 - 1}{2}$ are orthogonal over $(-1, 1)$. [6]

c) Find the Fourier transform of $f(t) = e^{-|t+1|}$ [8]

Q 5 a) Solve Using Laplace transform $\frac{d^2y}{dt^2} - 4y = 3e^t$ where $y(0) = 0$ & $y'(0) = 3$ [6]

b) Find Complex form of the Fourier series for $f(x) = e^{ax}$ in $-\pi < x < \pi$ [6]

c) Verify Green's Theorem for $\oint_C 2y^2\,dx + 3xdy$ where C is the boundary of the closed region bounded by $y = x^2$ and $y = x$. [8]

Q 6. a) Evaluate $L^{-1}\left[\frac{se^{-\frac{s}{2}} + \pi e^{-s}}{(s^2 + \pi^2)}\right]$ [6]

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

c) Using Stoke's theorem evaluate $\oint_C (y\,dx + z\,dy + x\,dz)$ where C is the curve of intersection of the sphere $x^2 + y^2 + z^2 = a^2$ and plane $x + z = a$ [8]

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SE SEM-III – EXTC – CHOICE BASE – 14/05/2019.

(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 4 questions. [20]
(a) Explain bleeder resistor and critical inductance.
(b) Explain zero temperature drift biasing.
(c) Explain effect of bypass capacitor and coupling capacitors on frequency response of amplifier
(d) Draw and explain high frequency model of BJT for CE configuration.
(e) Draw and explain small signal model of FET.

Q.2 (a) Design single stage *RC* coupled CS amplifier using self-bias method to meet following specifications: $|Av|$ =18, Vo= 2.5 Vrms, I_{DSS} = 7 mA, g_{mo} = 5600 µS, Vp=2.5 V, r_d=50 kΩ. [15]
(b) Calculate *Av*, *Zi* and *Zo* for the circuit designed in Q.2(a). [05]

Q.3 (a) A full wave rectifier using a centre tapped transformer with two diodes gives output of 250 V and current is 100 +/- 25 mA. If the ripple factor is 0.001.Calculate the specification of the devices and components required if the filter used is *LC* filter. [12]
(b) Explain the basic fabrication steps of passive elements. [08]

Q.4 (a) What is biasing? What is the need of biasing? Derive the expression for stability factor of collector to base bias circuit. [10]
(b) Calculate *Q*-point (I_{CQ} & V_{CEQ}) and stability factor (*S*) for the circuit shown in Fig. 4(b). [10]

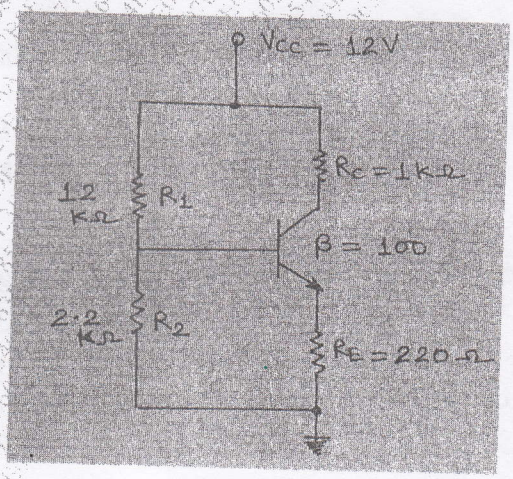

Fig. 4(b)

Q.5 (a) Derive the expressions for *Ai*, *Av*, *Zi*, *Zo* for CE amplifier with unbypassed R_E. [15]
(b) State and explain Miller's Theorem. [05]

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Q.6 (a) Sketch the frequency response for the circuit shown Fig. 6(a) where $C_1 = 0.5$ µF, $C_2 = 1$ µF, $C_S = 10$ µF, $C_{gs} = 5$ pF, $C_{gd} = 2$ pF, $C_{ds} = 3$ pF. Take $I_D = 3$ mA. [15]

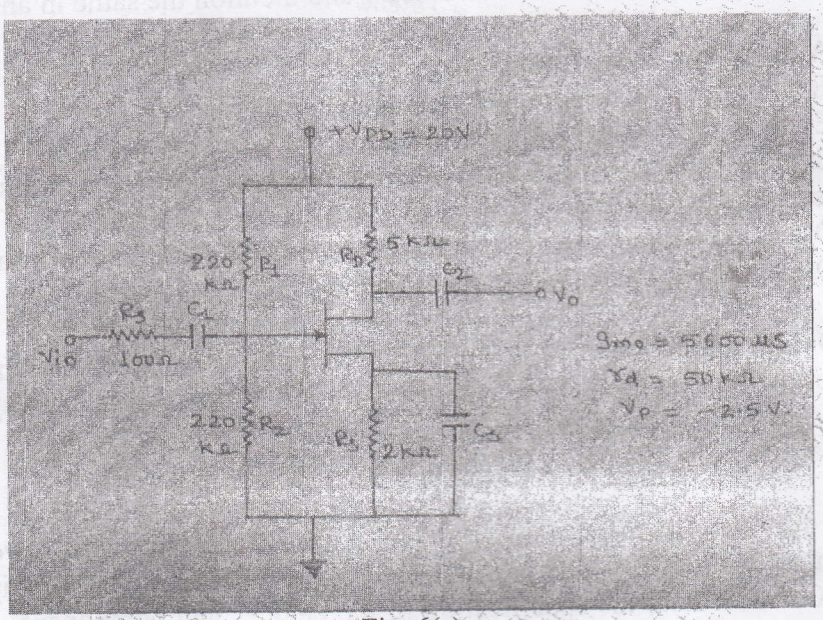

Fig. 6(a)

(b) Write a short note on small signal model of diode. [05]

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Q. P. Code: 27582

BE / Sem III / EXTC / Choiced Based / 20-05-2019

(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) Perform the following operation using 2's compliment [20]

i) $(14)_{10} - (24)_{10}$

ii) $(24)_{10} - (14)_{10}$

Comment on results of (i) and (ii)

b) If $F(A,B,C) = \sum m(0,3,5,7)$ with its truth table and express F in SOP and POS form

c) Compare FPGA and CPLD.

d) Explain Static RAM

Q.2 a) Write VHDL code for 3 bit up counter. [10]

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

b) Draw and explain a neat circuit diagram of BCD adder [10]

Q.4 a) Draw and explain two input TTL NAND gate. [5]

b) Compare combinational circuits and sequential circuits [5]

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

Q.5 a) What is excitation table? Explain the excitation table of SR flip flop. [5]

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

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

Q.6 a) Implement following Boolean function using 8:1 multiplexer [6]

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

b) State and prove Demorgan's theorem [4]

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

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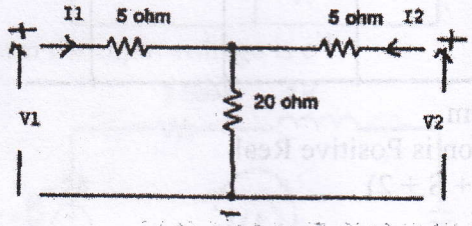
- SE (EXTC) Sem III Choice Based - 24/05/19

[Time: 3 Hours] [Marks:80]

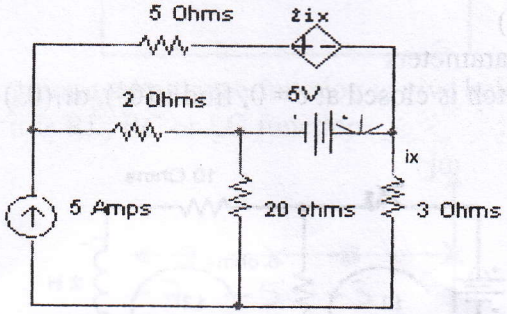
Please check whether you have got the right question paper.

N.B:
1. Question one is compulsory.
2. Answer any three questions from the remaining five.
3. Assume suitable data if required.

1. a) Find y parameters. 05



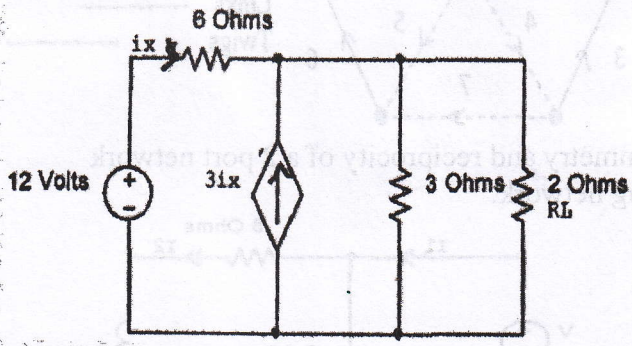
b) Find the current through 5Ω resistor 05



c) What is a Positive Real function? What are the properties of PR function? 05

d) Realize the following function in Cauer-I and Cauer-II forms 05
$Z(s) = S(S+3) / (S+1)$

2. a) Find the current through RL, in the circuit given below using Norton's theorem and also find power dissipated in R_L. 08

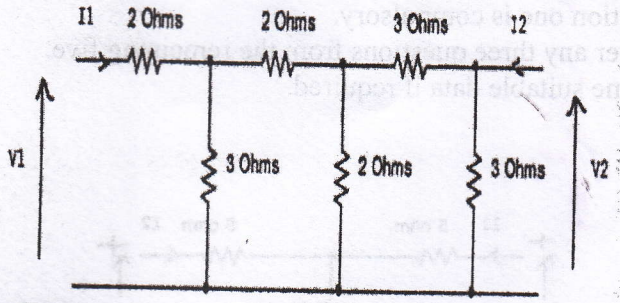


b) Check whether the following functions are Hurwitz 06
i) $P(s)= S^4+6S^3+10S^2+18S+36$
ii) $P(s)=S^6+ 2S^5+5S^4+8S^3+8S^2+8S+ 1$

c) Draw the graph of the network whose incidence matrix is given below. 06

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

3. a) Find the overall ABCD parameters of the following network, by dividing the network into two or more sections.



b) State and prove final value theorem. 05

c) Test whether the following function is Positive Real 05

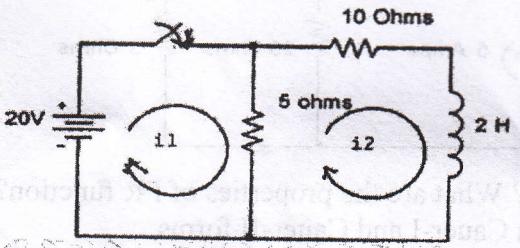
$F(S) = (2S^2 + 2S + 1) / (S^3 + 2S^2 + S + 2)$

4. a) Synthesize the following function in Foster-I and Foster-II forms 08

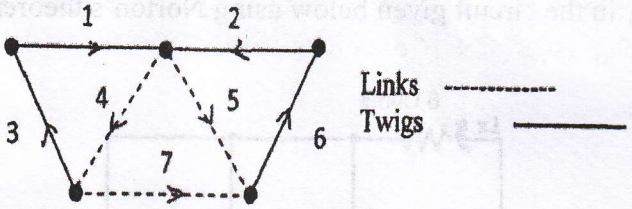
$Z(S) = 4(S + 2)(S + 7) / S(S + 4)$

b) Find h parameters in terms of z parameters 06

c) In the following network the switch is closed at t = 0, find $i_1(0^+)$, $di_1(0^+)/dt$, $d^2i_1(0^+)/dt^2$, $i_2(0^+)$, $di_2(0^+)/dt$ 06

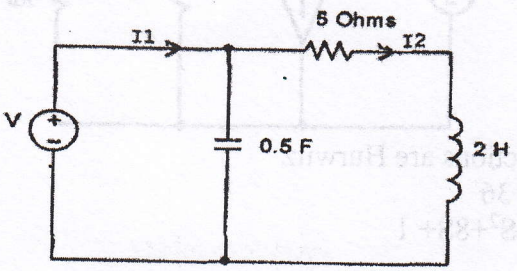


5. a) Obtain the tieset and f-cutset matrix for the graph given below. 10

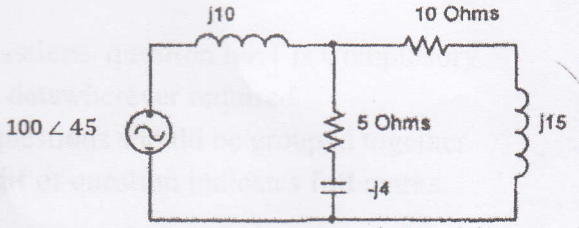


b) Find the condition for symmetry and reciprocity of a 2 port network 06

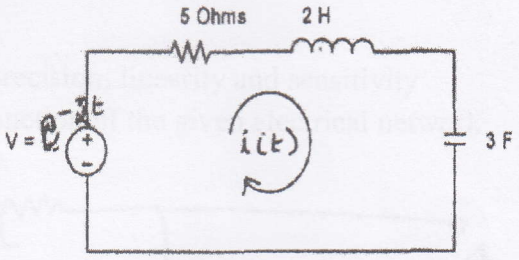
c) Find I_2/I_1 for the following network. 04



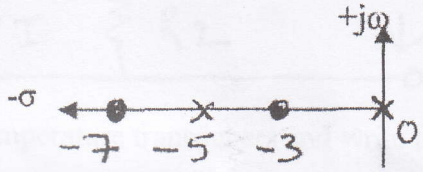
a) Find the voltage across 10Ω resistor using mesh analysis 08



b) Find i(t) using Laplace Transform the input voltage is e^{-2t}. 08



c) The pole zero plot of a driving point admittance function is give below. Find the function if Z (-4) = 5 and state whether it is RL, RC or LC function. 04



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Paper / Subject Code: 51205 / Electronics Instrumentation and Control

E SEM-III - EXTC - CHOICE BASE - 30/05/2019

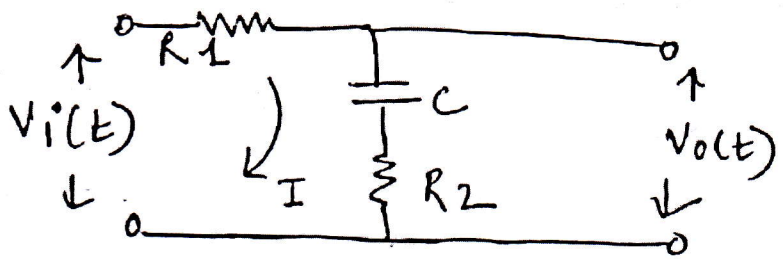
Time: 3 Hours **Total Marks: 80**

N.B:

(1) Attempt **four** questions, question **no:1** is Compulsory.
(2) Assume suitable datawherever required.
(3) Answers to the questions should be grouped together.
(4) Figure to the **right** of question indicates **full** marks.

1. Attempt **all:** **20**

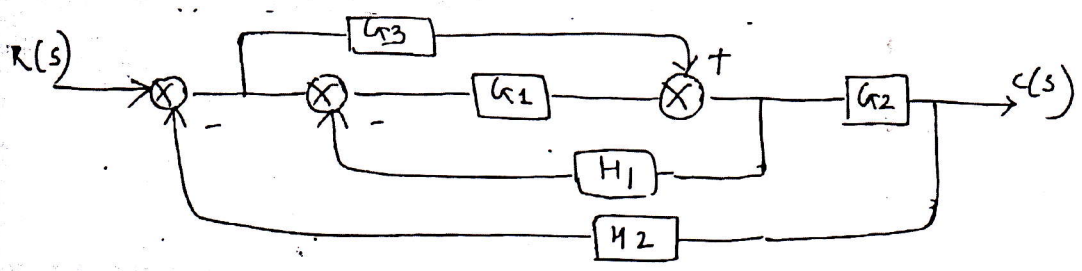
(a) Define accuracy, precision, linearity and sensitivity
(b) Find the transfer function of the given electrical network



(c) List various types of temperature transducers and write the applications of each transducers
(d) Explain basic telemetry system
(e) $s^3 - 4s^2 + s + 6 = 0$ is the characteristic equation of a certain control system. Determine its stability by Hurwitz method

2.

(a) Explain measurement of inductance using Maxwell bridge .Also list the applications of it **10**
(b) Using Block diagram reduction techniques, find closed loop transfer function **10**



3

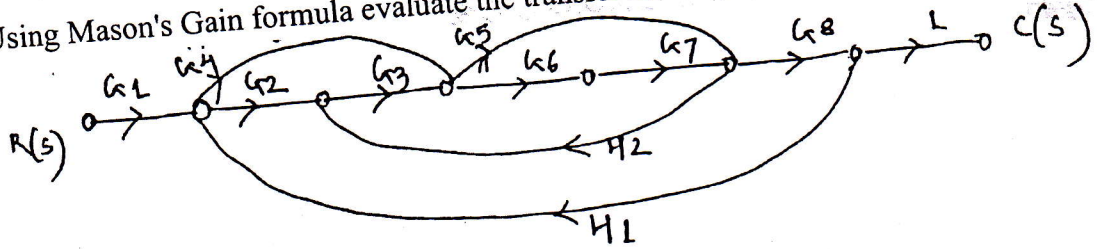
(a) Sketch the root locus of a unity feedback control system with $G(s) = \frac{K}{s(s+5)(s+10)}$ .Comment on the stability **10**
(b) A Unity feedback control system has $G(S) = \frac{80}{s(s+2)(S+20)}$. Draw the bode plot and predict stability y

(a) Explain the components of analog data acquisition system 05

(b) For a unity feedback system $G(s) = \frac{k}{s(1+0.4s)(1+0.25s)}$ find range of values of K, marginal value of K and frequency of sustained oscillations 05

(c) Explain in detail the working principal of LVDT with neat diagram and explain its application 10

5 (a) Using Mason's Gain formula evaluate the transfer function $(c(S))/(R(s))$ 10



(b) Explain the working principle of Q meter Mention the sources of errors in Q meter 10

6

(a) 05

(i) Explain multiplexing and discuss any one multiplexing system

(ii) For a unity feedback system having open loop transfer function

$$\frac{K(s+2)}{s(s^3+7S^2+12S)}$$ 05

Find the type of system and all error coefficients

(i) Draw and explain the working of capacitive transducer for pressure measurement 05

(ii) How stability of the system can be analyzed using Nyquist criterion 05

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