SE/Sem-III -CBSGS)/ETRX, INST & EXTC/App. Maths-III

Q.P. Code : 13607 M-18

(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

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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 $y(0) = 1$. 08

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 $(-\pi, \pi)$ where a is not an integer. Hence deduce that when α is a constant other than an integer 08

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

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 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. 08

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/Sem-III (CBSGS)/ETRX/Electronics Devices/ May-18.

Q.P. Code : 24054

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Questions No. 1. is compulsory and solve THREE questions from remaining questions.
2. Assume suitable data if necessary.

Q1. Solve any Four. 20
a) Justify multiple carriers are generated during Avalanche breakdown in zener diode.
b) Why BJT does not work properly at high frequencies.
c) How current flows in E-MOSFET without presence of channel inside.
d) Justify APD is superior to Photodiode.
e) State applications of Power Devices.

Q2. a) Draw construction of IMPATT diode and explain its working with necessary waveforms. 10
b) What is the use of small signal ac model of BJT, draw and explain hybrid –II model. 10

Q3. a) Derive equation of Electric field and maximum electric field when PN junction under zero bias 10
b) Draw construction VI characteristics and small signal model of JFET. 10

Q4 a) Explain working of MOSFET considering different values of VGS voltages. 10
b) What is solar cell explain its structure and model and working. 10

Q5 a) Draw structure of IGBT, explain VI characteristics and working. 10
b) What is MESFET draw its structure VI characteristics and explain its operation. 10

Q6 a) With the help of Energy Band diagram explain different metal semiconductor ohmic contacts. 10
b) Explain VI characteristics of TRIAC and state its use in power Electronic circuit. 05
c) What is HBT compare energy band diagram of BJT with HBT 05

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SE/ETRX/Sem-III (CBSGS)/Digital Circuits & Design/
May- 2018

Q.P. Code :33463

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.
2. Solve any three from remaining five questions.

Q.1 a) Explain the term noise margin and its value for TTL and CMOS family. **05**
b) Differentiate between synchronous and asynchronous counter. **05**
c) Draw truth table and logic diagram of Full Adder. **05**
d) Explain shift registers and its applications **05**

Q.2 a) Use K-map to reduce the following function and then implement it by NOR gates only. **10**

$$F(ABCD) = \sum m\,(4,6,12,14) + \sum d\,(1,3,9,11)$$

b) Implement the following function using 8:1 MUX and logic gates. **10**

$$P(A,B,C,D) = \sum m\,(1,2,5,8,10,12,15) + \sum d\,(0,6)$$

Q.3 a) Design a mealy sequence detector to detect 1010 using D flip-flops and logic gates. **10**

b) Design a MOD 5 asynchronous counter and explain the glitch problem. **10**

Q.4 a) Design a circuit with optimum utilization of PLA to implement the following functions. **10**

$$F1 = \sum m\,(2,12,13)$$

$$F2 = \sum m\,(7,8,9,10,11,12,13,14,15)$$

$$F3 = \sum m\,(1,2,8,12,13)$$

b) Design 4 bit Johnson counter using J-K flip-flop. Explain its working using waveform. **10**

Q.5 a) Eliminate redundant states and draw the reduced state diagram.

PS	NS		O/P	
	X=0	X=1	X = 0	X = 1
1	2	3	0	0
2	2	4	0	0
3	2	3	0	0
4	5	3	0	0
5	2	6	0	1
6	5	3	0	0

b) Discuss XC 4000 FPGA architecture with neat block diagram.

Q.6 Write short notes on

a) VHDL
b) Stuck at '0' and stuck at '1' fault
c) Master slave JK flip flop
d) BCD Adder

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S.E./SEM III (CBSGS) /Electronics Engg./MAY 2018

Circuit Theory

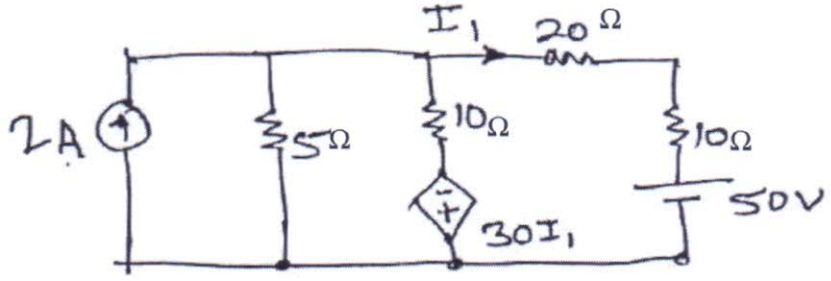
Q. P. Code : 50071

REVISED COURSE

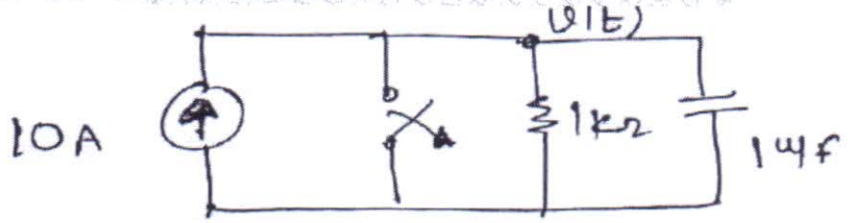
(3 Hours) **Total Marks: 80**

N. B. 1) Question No. 1 is compulsory.
2) Attempt any three questions out of the remaining five questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required but justify the same.

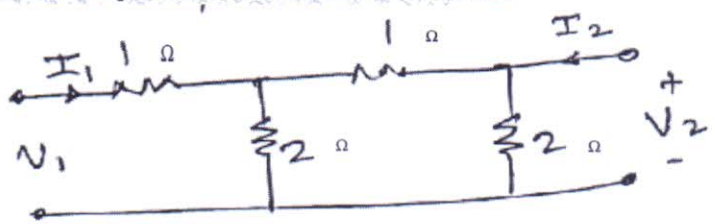
Q.1 (A) Find the voltage across 5 Ω resistor using Nodal Analysis. [5M]



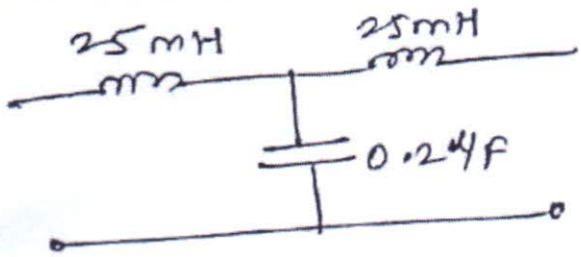
Q.1 (B) Find V, dV/dt and d^2V/dt^2 at $t=0^+$. [5M]



Q.1 (C) Determine ABCD parameter for the network shown. [5M]



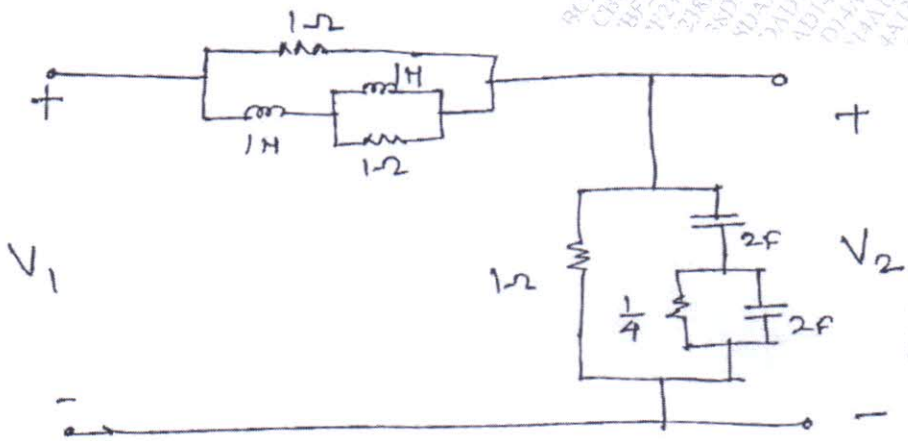
Q.1 (D) Find k, f_c & passband for the network shown. [5M]



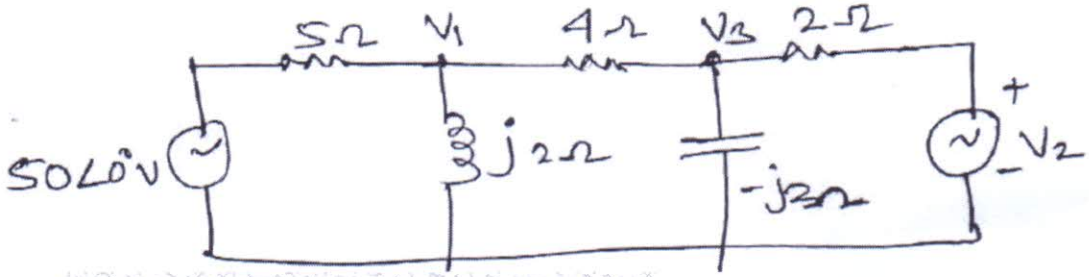
[P.T.O.

Q.2 (A) State maximum power transfer theorem. Draw power diagram for variation of R_L. Determine the maximum value of R_L power transfer. [10M]

Q.2 (B) For the network shown in fig. Prove that the input impedance of port 1 is 1Ω and also Find the Voltage Transfer function. [10M]



Q.3 (A) In the network of figure, find the voltage V_2 which results in zero current through 4Ω [10M]



Q.3 (B) Check whether $P(s) = 2s^6+s^5+13s^4+6s^3+56s^2+25s+25$ is Hurwitz. [5M]

Q.3 (C) Plot the pole and zero of the given network function. Also obtain time domain response of it. [5M]

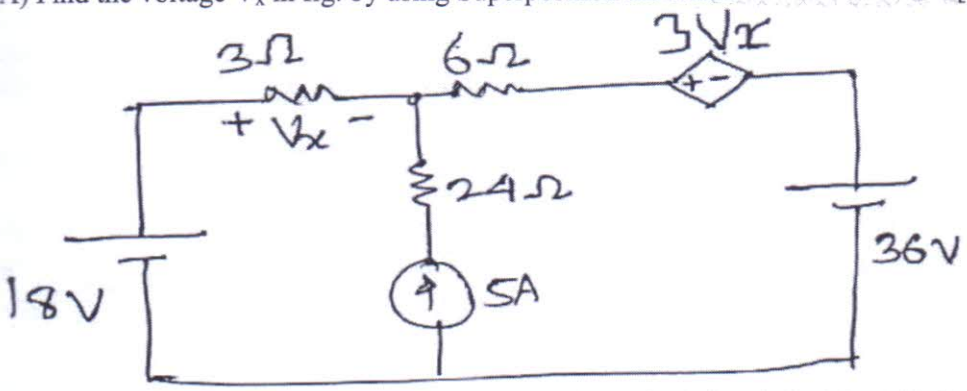
$$F(s) = \frac{2S}{(S+1)(S+2)}$$

Q.4 (A) Derive condition for reciprocity in terms of z-parameters and symmetry in terms of h-parameters. [10M]

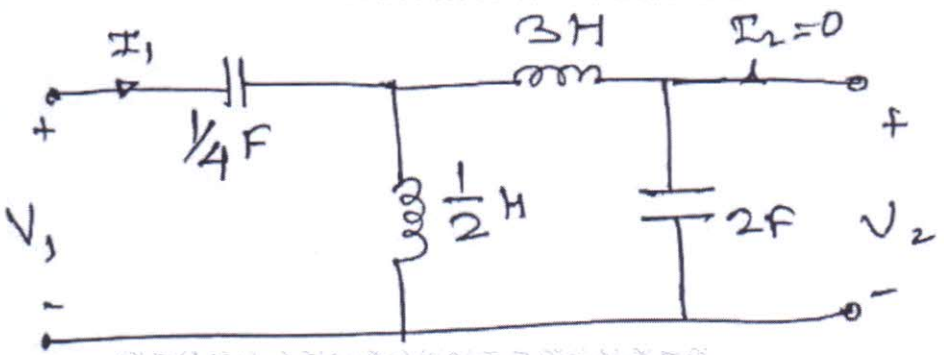
Q.4 (B) Design constant k-low pass filter using π- section having cut-off frequency of 4 kHz and nominal impedance of 500 Ω for the designed circuit find the characteristics impedance. Attenuation constant and phase constant at 2 KHz and 6 KHz. [10M]

[P. T. O

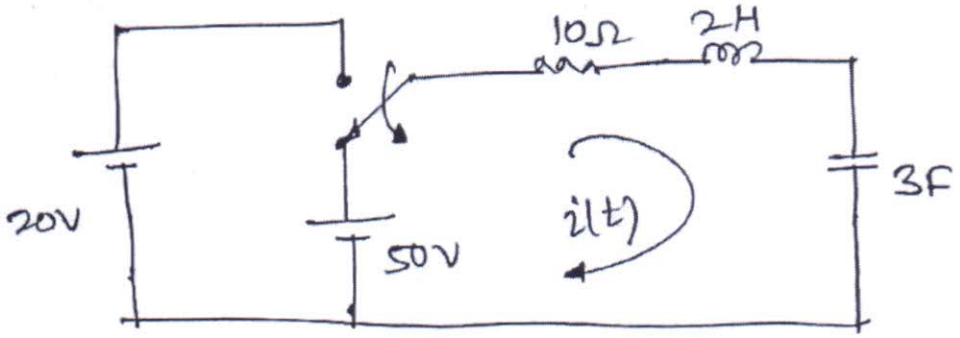
Q.5 (A) Find the voltage V_x in fig. by using Superposition theorem. [10M]



Q.5 (B) Find the network function $\frac{V1}{I1}$, $\frac{V2}{V1}$ & $\frac{V2}{I1}$ for the network in fig [10M]



Q.6 (A) Determine the expression for the current i(t). [10M]



Q.6 (B) Obtain the foster-I and Causer-I forms of the RL impedance function. [10M]

$$Z(s) = \frac{s(s+4)(s+8)}{(s+1)(s+6)}$$

S.E. Sem III (CBSGS) (Rev-2012) · June 2018.
(Electronics)

Q. P. Code: 40096

Elect. Instrumentation & Meas.

Duration : 3Hrs **Max Marks: 80**

N.B.-1] Question no.1 is compulsory
2] Attempt any three from remaining

Q1. Attempt any four **20 M**

a) Explain selection procedure of transducers.
b) Draw mega-ohm Bridge and list applications.
c) Define accuracy , precision, linearity, sensitivity and resolution.
d) Explain measuring principle of ' Q ' meter and list applications.
e) Explain level measurement using differential pressure technique.

Q2. Attempt the following **20 M**

a) Explain in detail different types of errors in measurement system.
b) Write short note on - dead weight tester.

Q3. Attempt the following **20 M**

a) Explain strain gauge transducer. Derive its gauge factor.
b) Draw a neat labeled McLeod Gauge system diagram.

Q4. Attempt the following **20 M**

a) Explain LVDT with neat labeled diagram.
b) Explain significance of Lissajous figures in detecting frequency and phase.

Q5. Attempt the following **20 M**

a) Explain single channel and multichannel data acquisition system with neat labeled separate block diagrams.
f) Draw block diagram of CRO. Also draw block diagram of DSO. No explanation needed.List applications of DSO.

Q6. Write Short note on following (any four) **20 M**

a) Temperature measurement techniques
b) Strain Gauges
c) Turbine flow meter
d) Pirani guage
e) Wien bridge and kelvin bridge

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