SE - EXTC - Sem III - CBGS -

Circuits & Transmission Lines

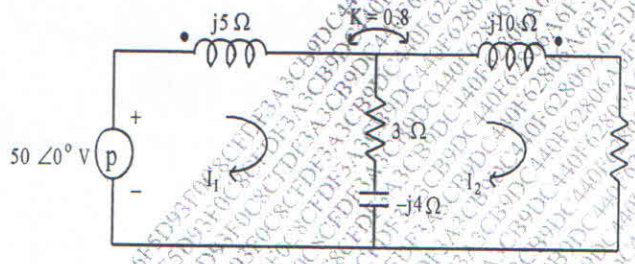
01/04/18

Q.P. Code: 24590

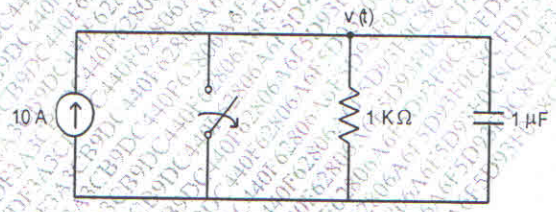
Time: 3 hours | Total Marks: 80

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



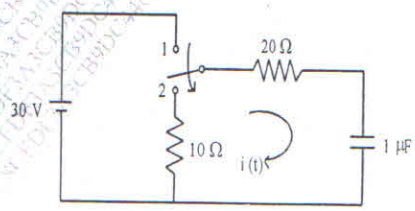
(B) In the given network of Fig., switch is opened at t = 0. Solve for v and $\frac{dv}{dt}$ at t = 0+. 05



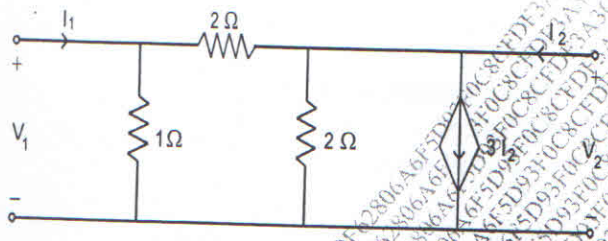
(C) Prove that AD – BC = 1 for Transmission parameters. 05

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

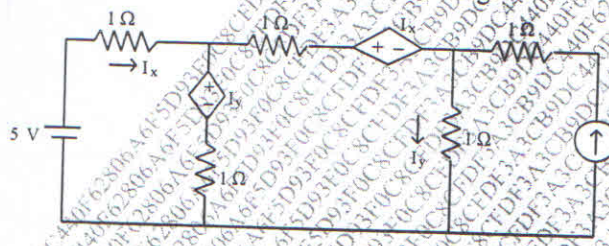
2 (A) In the network shown in Fig., switch is changed from position 1 to position 2 at t = 0, steady condition having reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d2i}{dt2}$ at t = 0+. 10



(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

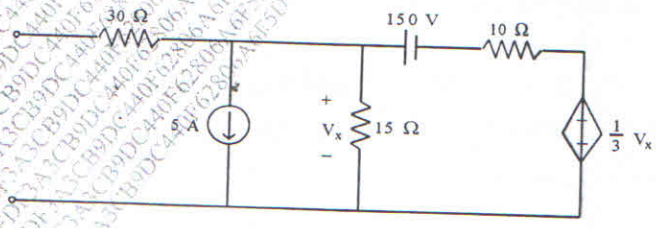
i) Characteristic Impedance
ii) Propagation Constant
iii) Attenuation Constant
iv) Phase Constant at 1 kHz

4 (A) Determine whether following functions are positive real 10

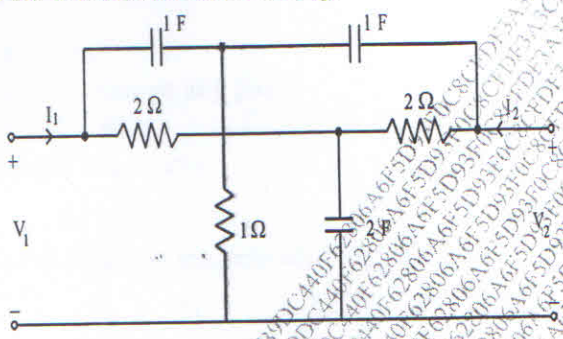
i) $\frac{s^4 + 3s^3 + s^2 + s + 2}{s^3 + s^2 + s + 1}$

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

(B) Obtain Thevenin equivalent network of Fig. 10



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

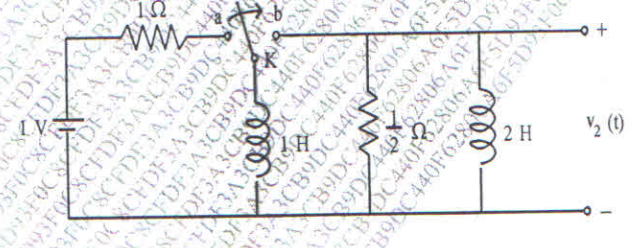


(B) Realize the following functions in Foster II and Cauer I form 10

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

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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S.E EXTC -Sem III- Digital Electronics

CBGS

22/05/2018

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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S.E. E TRX / EXTC – Applied Mathematics – III

CBGS

16/05/2018

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

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

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

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

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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SE CEXTC 8/5/2014
sem 3
Analog Electronics I

Q. P. Code: 24887

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

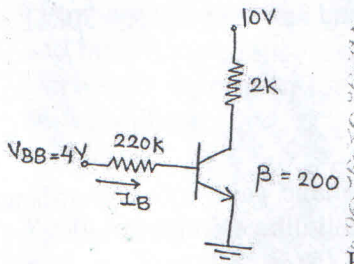

Fig.1

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

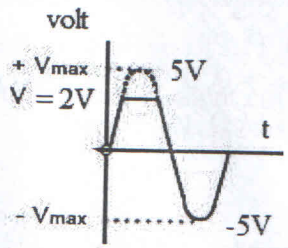

Fig.2

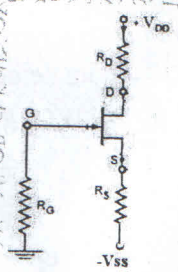

Fig.3

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

Q.2

a For the circuit shown in Fig.4 determine the V_{ECQ}, I_{CQ}, V_C, and V_E. 10

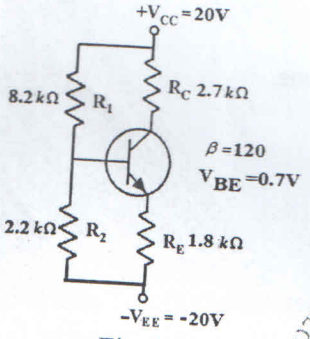

Fig.4

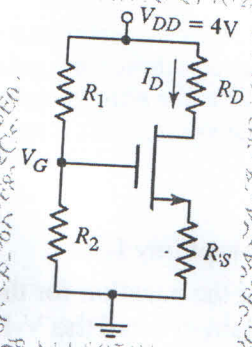

Fig.5

b Design the circuit shown in Fig.5 such that V_{GS}=0.50V and V_{DS}=2.5V. The transistor parameters are: V_{TN}=0.24V, Kn=1.1mA/V2, and λ=0. Let R_1+R_2=50KΩ. 10

Q.3

a Analyze and derive the expression for the voltage gain, input impedance and output impedance for common collector amplifier with voltage divider biasing. 10

b For the amplifier shown in Fig.6 analyze and determine. 10

i. Small-signal voltage gain.

ii. Input and output impedance.

BJT and circuit parameters are: $\beta = 100, V_{BE} = 0.7V$. $R_1 = 56k\Omega$, $R_2 = 12.2k\Omega$, $R_E = 0.4k\Omega$, $R_C = 2k\Omega, R_L = 10k\Omega R_S = 0.5k\Omega, V_{CC} = 10V$

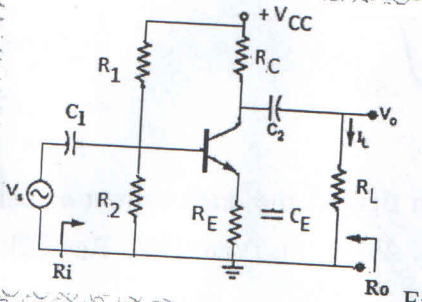

Fig.6

Q.4

a Draw the structure of an N-channel Enhancement type MOSFET. Explain its working with the help of output drain characteristics and transfer characteristics. 10

b For the MOSFET common source amplifier shown in fig.7 determine output voltage, input impedance and output impedance. Given: $V_{TN} = 1V$, $K_N = 0.5\ mA/V^2$, $\lambda = 0.01V^{-1}$. 10

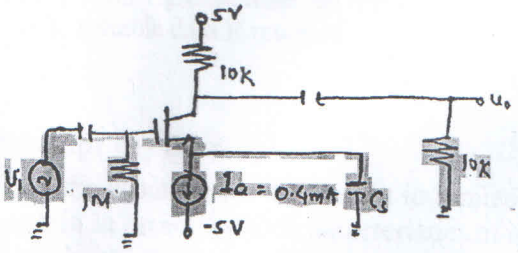

Fig.7

Q.5

a Draw and explain energy band diagram of MOS capacitor in accumulation, depletion and inversion region. 10

b Derive the expression for frequency of oscillation for a transistorized (BJT) RC phase shift oscillator. 10

Q.6 Write a short note on following.

a Cristal oscillator and its application. 5

b Schottkey Diode (Construction and operation and application) 5

c Graphical analysis of BJT amplifier to determine parameters. 5

d h-Parameter equivalent circuit for BJT 5

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