**Q. P. Code : 38831**

1T01013 - S.E.(ELECTRONICS & TELE-COMMN)(Sem III) (CBSGS) / 49601 - ANALOG ELECTRONICS - I

**(3 Hours)** **(Total 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) Draw switching characteristics of a diode and explain the reverse recovery time.

b) Calculate $V_{CEQ}$ for the common base circuit shown in Fig. 1b if the transistor parameter is $\beta$=120

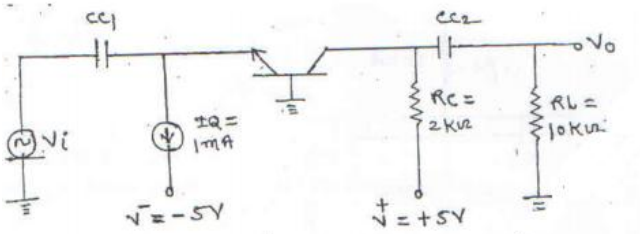


**Fig. 1b**

c) Draw small signal model of JFET and explain the significance of each parameter.

d) Compare CE, CB and CC configuration.

e) Draw small signal hybrid pi model of BJT including early effect.

f) What are the Barkhausean's criteria for sustained oscillation?

Q.2 a) Draw the output of the clipper circuit shown in Fig. 2a, If a sine wave of 15sinωt is applied as an input. Assume practical diode with suitable cut in voltage. **[10]**

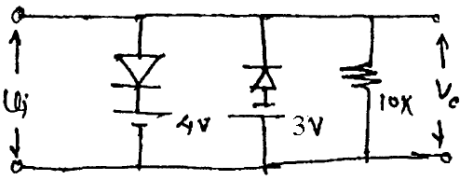


**Fig. 2a**

b) Derive the expression for frequency of oscillation for a Wein Bridge oscillator **[10]**

Q.3 a) Find $I_{DQ}$ , $V_{GSQ}$, $V_D$ and $V_S$ for the circuit shown in Fig 3a **[10]**

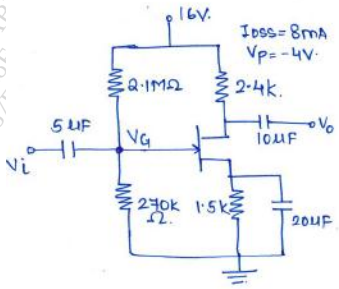


**Fig. 3a**

**TURN OVER**

b) Explain the construction and characteristics of n channel Enhancement MOSFET. Draw transfer and drain characteristics. **[10]**

Q.4 a) Derive expressions for voltage gain, input resistance and output resistance for source follower circuit using n channel MOSFET **[10]**

**Fig.4a**

b) Determine the hybrid pi parameters for the circuit shown in Fig 4b. The transistor parameters are $V_{BE\,(on)} = 0.7$ V, $\beta = 100$ and $V_A = 100$V. **[10]**

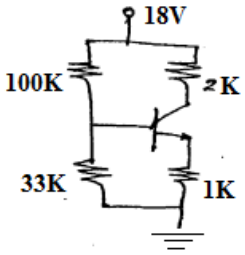


**Fig. 4b**

Q.5 a) For the circuit shown below in Fig.5b, the transistor parameters are $V_{BE\,(on)} = 0.7$ V, $\beta = 140$ and $V_A = \infty$. Determine $Z_i$, $Z_o$ and $A_V$ **[10]**

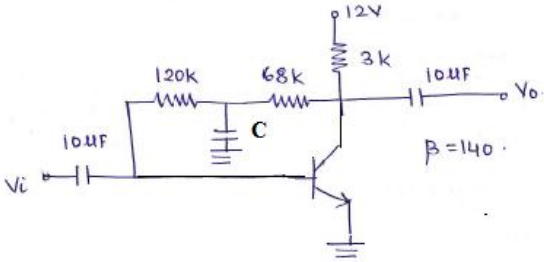


**Fig. 5a**

b) Draw and explain energy band diagram of MOS capacitor in accumulation, depletion and inversion region. **[10]**

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

a) Construction and operation of schottky diode
b) LC oscillators
c) AC and DC load line
d) Small signal equivalent circuit of CC amplifier
e) Regions of operation of FET

**(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 $\int_0^\infty e^{-2t} t \sin t \, dt$. (5)

(b) Find $a, b, c, d, e$ if $f(z) = (ax^3 + bxy^2 + 3x^2 + cy^2) + i(dx^2y - 2y^3 + exy)$ is analytic. (5)

(c) Find half range sine series of $f(x) = x(\pi - x), 0 < x < \pi$. (5)

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

Q.2 (a) Prove that $\nabla r^n = n r^{(n-2)} \bar{r}$. (6)

(b) Find Bilinear Transformation which maps the points $z = -1, 0, 1$ onto the points $w = -1, -i, 1$. (6)

(c) Find i) $L^{-1}\left[\frac{e^{-2s}}{s^2 + 3s + 2}\right]$ ii) $L^{-1}\left[\log\left(\frac{s^2 + 4}{s + 4}\right)\right]$. (8)

Q.3 (a) Use Gauss's Divergence Theorem to evaluate $\iint_s \bar{N}.\bar{F} \, ds$ where $\bar{F} = 4xi - 2y^2 \, j + z^2 k$ and $s$ is region bounded by $x^2 + y^2 = 4, z = 0, z = 4$. (6)

(b) Find Laplace Transform of $e^{-2t} \int_0^t u e^{3u} \cos 4u \, du$. (6)

(c) Obtain Fourier series of $f(x) = \begin{cases} x + \frac{\pi}{2} & -\pi < x < 0 \\ \frac{\pi}{2} - x & 0 < x < \pi \end{cases}$. (8)

Hence deduce $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \cdots$

Q.4 (a) Show that set of functions $\left\{\frac{\sin x}{\sqrt{\pi}}, \frac{\sin 2x}{\sqrt{\pi}}, \frac{\sin 3x}{\sqrt{\pi}} \cdots\right\}$ form an orthonormal set in $(-\pi, \pi)$. (6)

(b) Find orthogonal trajectories of the family of curves $e^x \cos y - xy = c$. (6)

(c) Prove that $\overline{F} = (6xy^2 - 2z^3)i + (6x^2y + 2yz)j + (y^2 - 6z^2x)k$ is irrotational. Find scalar potential of $\overline{F}$. Hence find the work done of moving particle from $(1,0,2)$ to $(0,1,1)$. (8)

Q.5 (a) Find Fourier Integral representation for $f(x) = \begin{cases} 1 - x^2 & |x| \le 1 \\ 0 & |x| > 1 \end{cases}$. (6)

(b) 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)

(c) Verify Green's Theorem for $\overline{F} = x^2 i - xy\, j$ and $c$ is triangle having vertices $A(0,2)$, $B(2,0)$, $C(4,2)$. (8)

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

(b) Prove that $J_{-\frac{5}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left[\frac{3}{x}\sin x + \frac{(3 - x^2)}{x^2}\cos x\right]$. (6)

(c) Find Fourier series for $f(x) = (\pi - x)^2$ in $0 \le x \le 2\pi$. Hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$ (8)

**Q. P. Code : 37078**

S.E.(ELECTRONICS & TELE-COMMN)(SEM III) (CBSGS) (REV. -2012 ) / 49602
APPLIED MATHEMATICS-III

**( 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) Evaluate $\int_0^\infty e^{-2t} sin^2 2t\, dt$. 05

b) Find an analytic function $f(z) = u + iv$ where $u + v = e^x(\cos y + \sin y)$. 05

c) Obtain Fourier series of $x \cos x$ in $(-\pi, \pi)$. 05

d) Evaluate $\int_C \bar{F} \cdot d\bar{r}$ where $\bar{F} = x^2\, i + xy\, j$ from $(0,0)$ to $(1,1)$ along the parabola $y^2 = x$. 05

Q.2 a) Find half-range cosine series for $f(x) = e^x,\ 0 < x < 1$. 06

b) Prove that 06
$\bar{F} = (x + 2y + az)\, i + (bx - 3y - z)\, j + (4x + cy + 2z)\, k$
is solenoidal and determine the constants $a, b, c$ if $\bar{F}$ is irrotational.

c) Prove that $w = i\left(\frac{z-i}{z+i}\right)$ maps upper half of the $z-$plane into the interior of the unit circle in the $w-$plane. 08

Q. 3 a) Prove that $J_n(x)$ is an even function if $n$ is even integer and is an odd function if $n$ is odd integer. 06

b) Find the inverse Laplace transform of 06
$\frac{s^2+2s+3}{(s^2+2s+5)(s^2+2s+2)}$.

c) Obtain the complex form of Fourier series for $f(x) = e^{ax}$ in $(0, a)$. 08

Q. 4 a) Prove that $\nabla f(r) = f'(r)\frac{\bar{r}}{r}$ and hence, find $f$ if $\nabla f = 2r^4\bar{r}$. 06

b) Prove that $4J''_n(x) = J_{n-2}(x) - 2J_n(x) + J_{n+2}(x)$. 06

c)

(i) Find the Laplace transform of $e^{4t}\ sin^3 t.$ 04

(ii) Find the Laplace transform of $t\sqrt{1+\sin t}.$ 04

Q. 5 a) Prove that $\int x \cdot J_{\frac{2}{3}}\left(x^{\frac{3}{2}}\right) dx = -\frac{2}{3}\, x^{-\frac{1}{2}} J_{-\frac{1}{3}}\left(x^{\frac{3}{2}}\right).$ 06

b) Find $p$ if $f(z) = r^2 \cos 2\theta + i\, r^2 \sin p\theta$ is analytic. 06

c) If $f(x) = \begin{cases} \pi x, & 0 \le x \le 1 \\ \pi(2-x), & 1 \le x \le 2 \end{cases}$ with period 2, show that 08

$f(x) = \frac{\pi}{2} - \frac{4}{\pi} \sum_{n=0}^{\infty} \frac{1}{(2n+1)^2} \cos(2n+1)\pi x.$

Q. 6 a) Show that the set of functions $\cos nx,\ n = 1, 2, 3, \ldots$ is orthogonal on $(0, 2\pi)$. 06

b) Use Stoke's theorem to evaluate $\int_C \bar{F} \cdot d\bar{r}$ where $\bar{F} = (2x - y)\, i - yz^2\, j - y^2 z\, k$ and $S$ is the surface of hemisphere $x^2 + y^2 + z^2 = a^2$ lying above the $xy$ −plane. 06

c) Use Laplace transform to solve 08

$\frac{d^2y}{dt^2} + y = t$ with $y(0) = 1, y'(0) = 0.$

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**Paper / Subject Code: 49605 / CIRCUITS AND TRANSMISSION LINES**

Sem III / CBSGS / EXTC 17/12/18

Time: 3 hours Total Marks: 80

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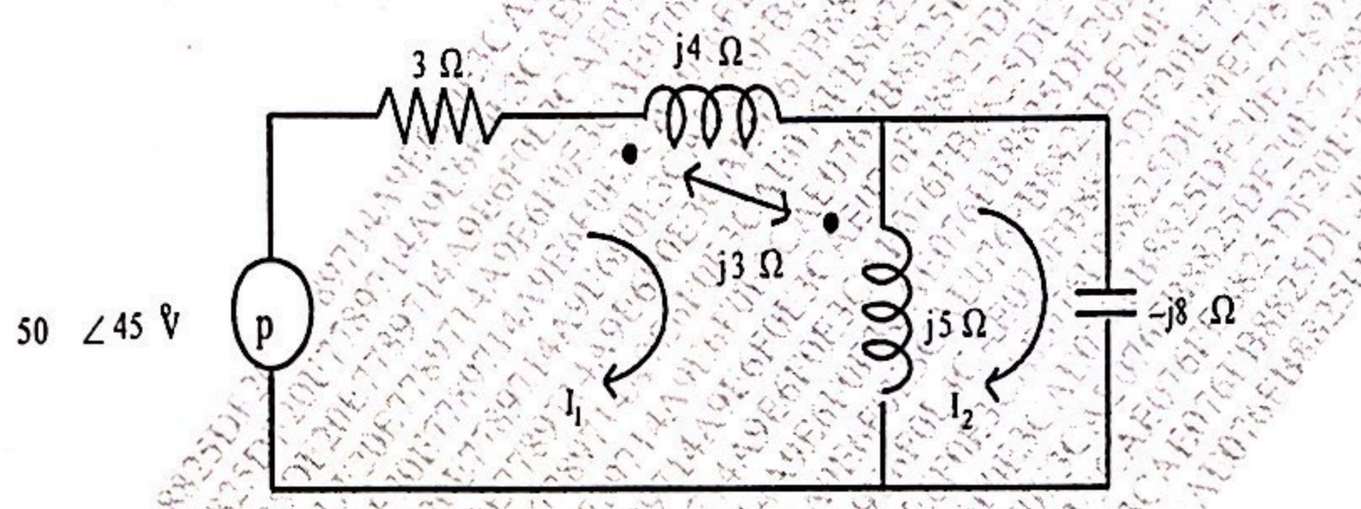
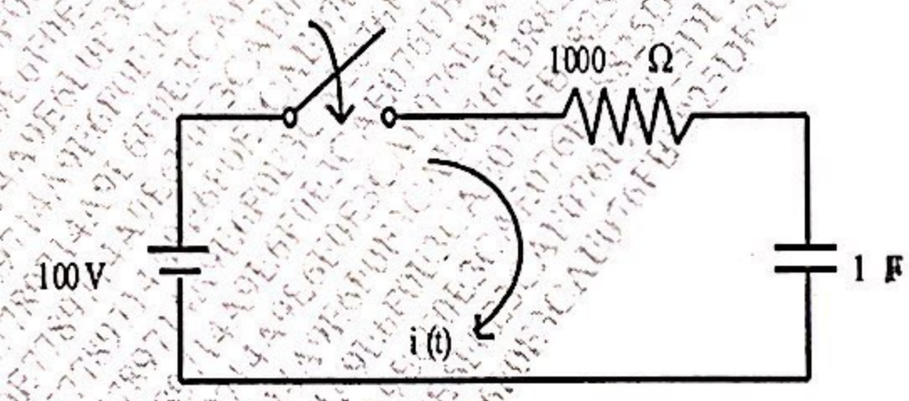
N.B.
1) Question No. 1 is Compulsory
2) Out of remaining questions, attempt any three
3) Assume suitable data if required
4) Figures to the right indicate full marks

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



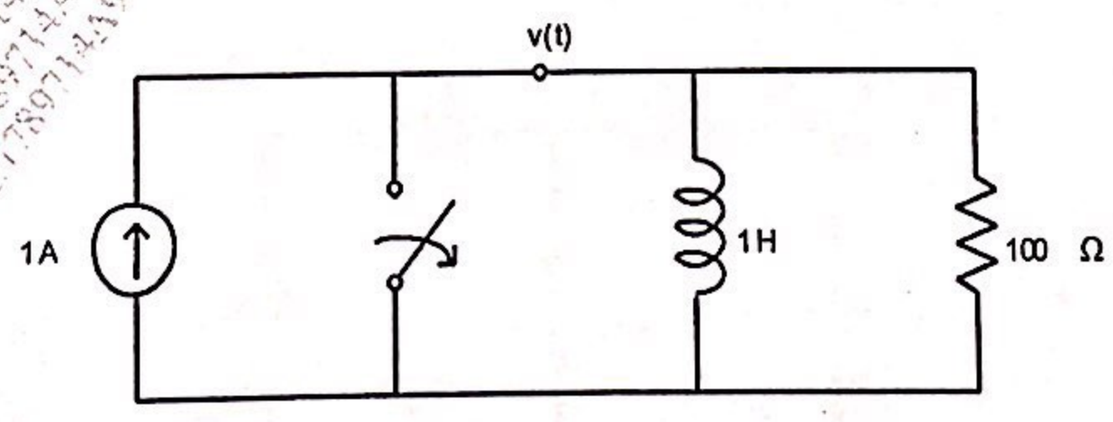

(B) In the network of Fig. switch is closed at t = 0. With capacitor uncharged, find value for i and $\frac{di}{dt}$ at $t = 0^+$. **05**



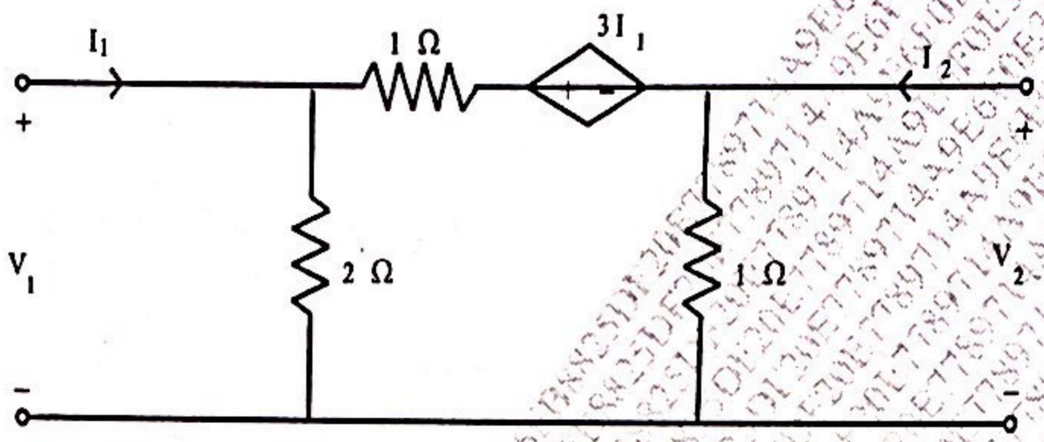

(C) Prove that AD – BC = 1 for Transmission parameters. **05**

(D) Design an m-derived T section high pass filter with a cut-off frequency of 2 kHz. Design impedance of 700Ω and m = 0.6. **05**

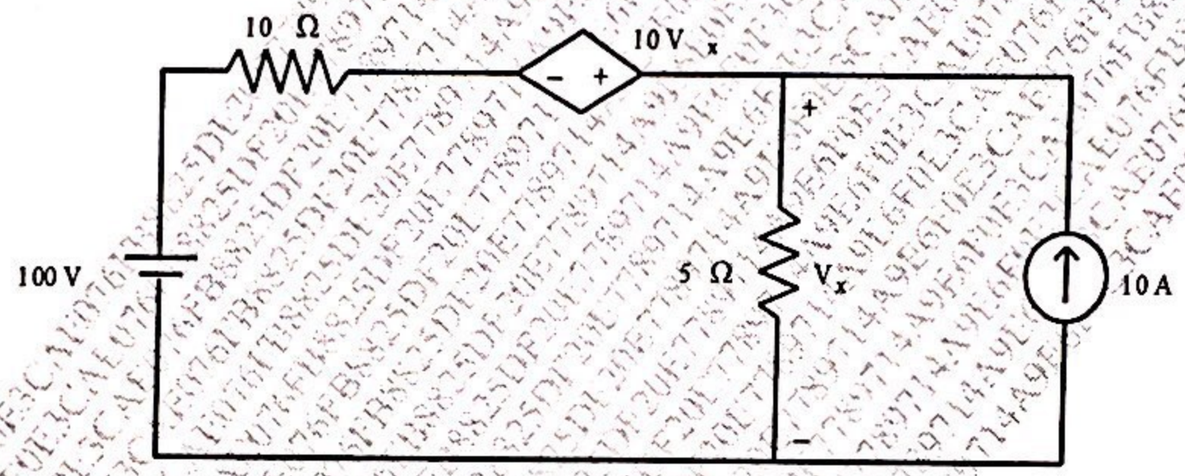
2 (A) In the network shown in Fig., at t = 0, switch is opened. Calculate v, $\frac{dv}{dt}$ , $\frac{d2v}{dt2}$ at t = 0+. **10**



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




3 (A) Determine the current through 10 Ω resistor in the network of 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**

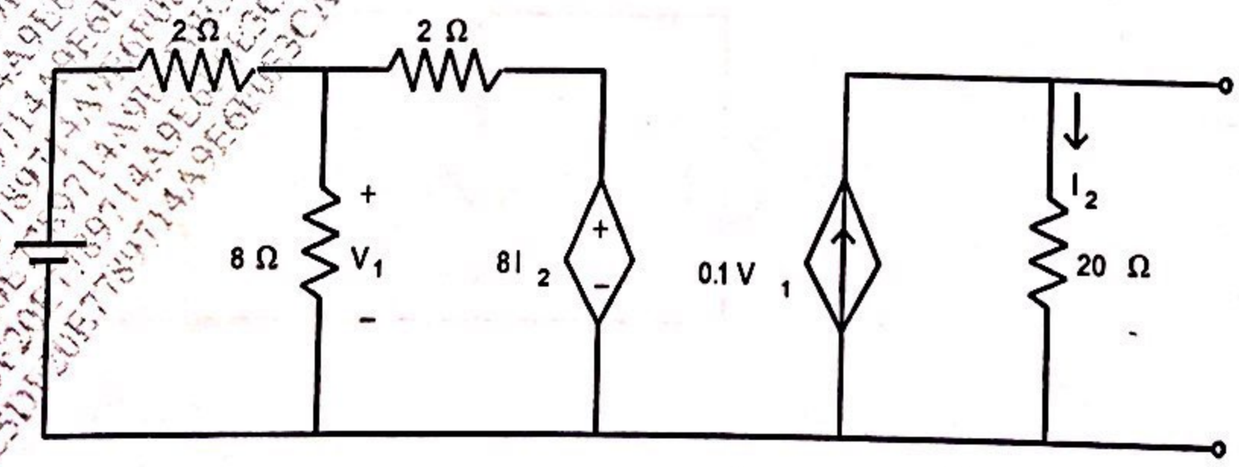
i) Characteristic Impedance
ii) Propagation Constant
iii) Attenuation Constant
iv) Phase Constant at 1 kHz

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

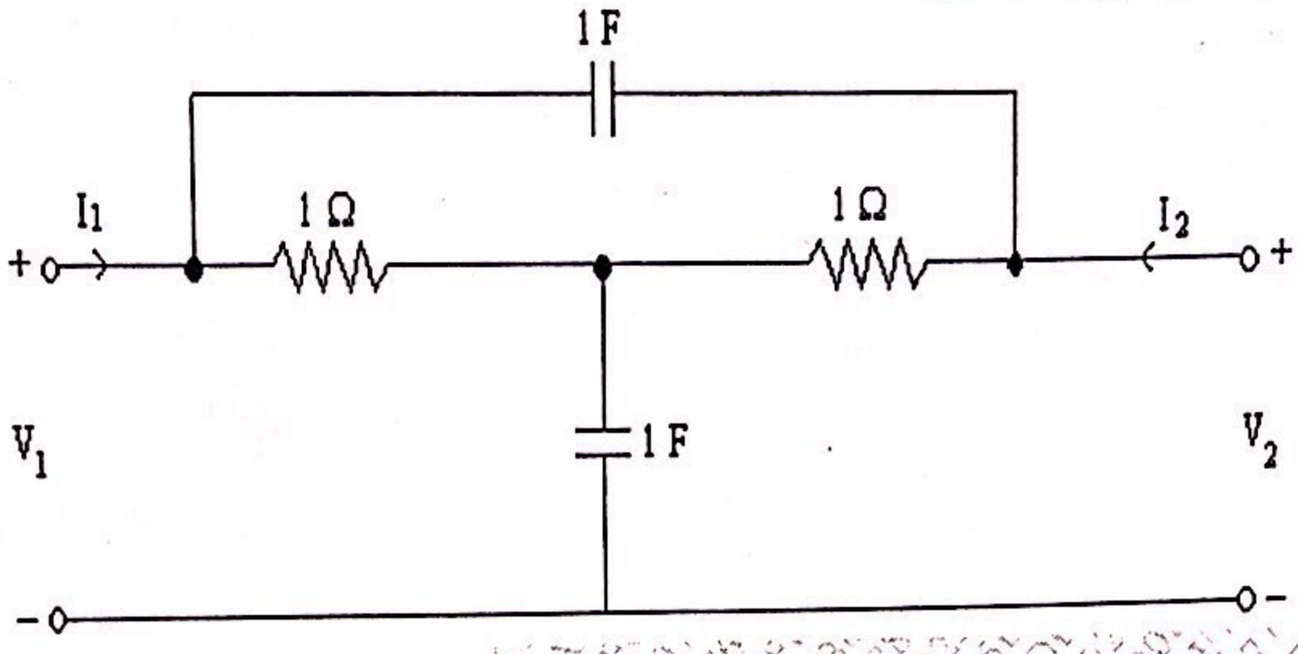
i) $\frac{s^2 + 2s + 4}{(s+1)(s+3)}$

ii) $\frac{s^2 + 25s + 25}{s + 4}$

(B) Find Norton's equivalent network. **10**



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

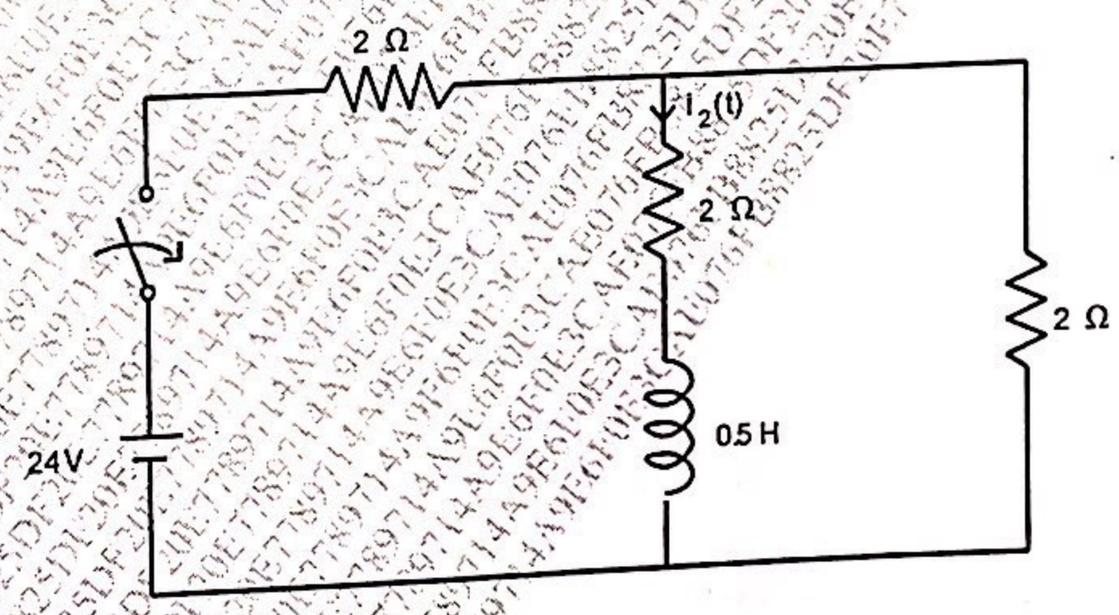



(B) Realize the following functions in Foster II and Cauer I form **10**

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

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) Determine current i2 (t) in the network of Fig., when switch is closed at t = 0. The inductor is initially deenergized. **10**

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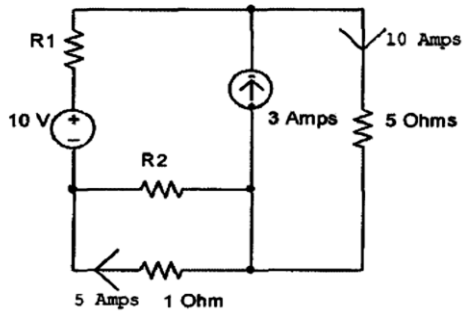
**[Time: 3 Hours]** **[ Marks:80]**

Please check whether you have got the right question paper.

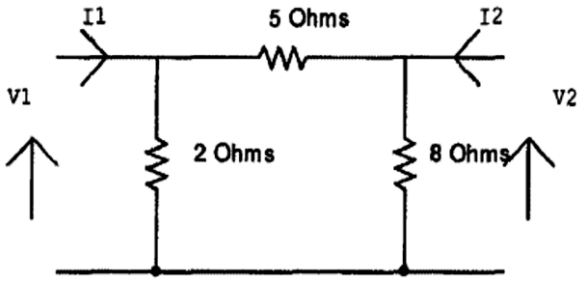
N.B: 1. Question one is compulsory.
2. Answer any three questions from the remaining five.
3. Assume suitable data if required.

1. Answer all the questions

a) Find $R_1$ and $R_2$ in the following circuit. 05

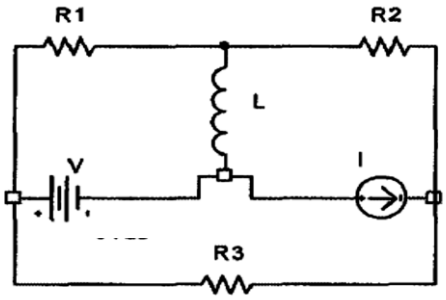



b) Find h parameters for the following 2-port network. 05

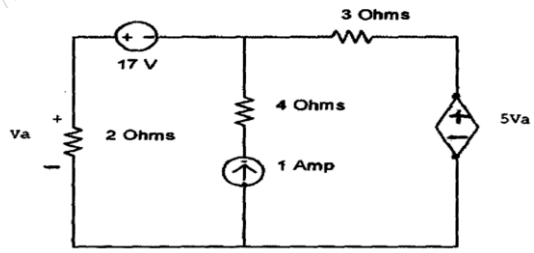



c) The poles of a driving point impedance function are at 0, -5, and zero at -2, find the function if Z(-3) = 1/6 and synthesize the same in cauer-I form. 05

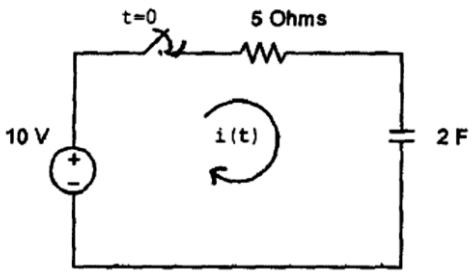
d) Draw the graph of the following network and obtain incidence matrix. 05



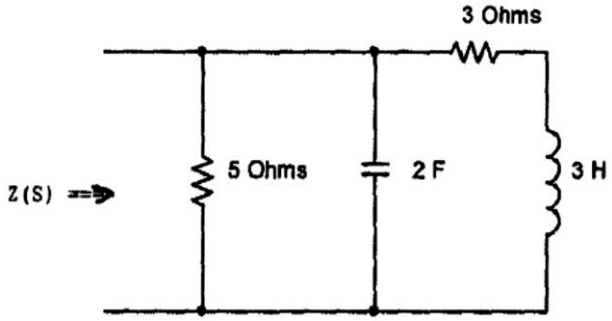

2. a) For the circuit shown below, find the current through 3 ohms resistor, using superposition theorem. 10



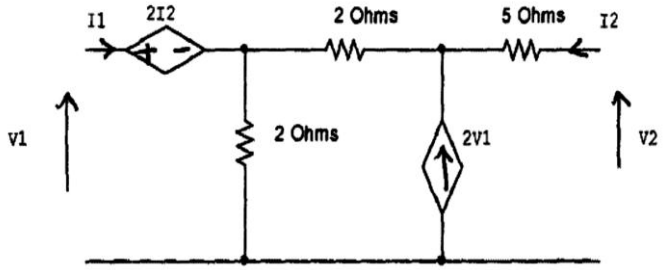
b) In the following series RC circuit the switch is closed at t=0, find the expression for the current through the capacitor and sketch i(t) versus t. 05




c) Find the driving point impedance for the following network. 05

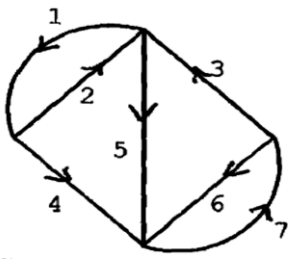



3. a) Find the ABCD parameters for the following 2-port network 10




b) Check whether the following functions are Hurwitz 05
i) $F(S) = S^5+4S^3+2S$
ii) $F(S) = S^5+2S^4+5S^3+10S^2+4S+8$

c) The graph of a network is given below. Obtain the tieset matrix. 05

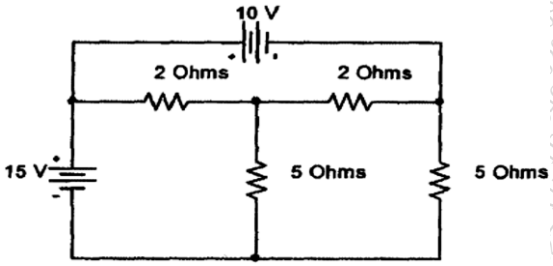



4. a) Synthesize the following driving point impedance function in Cauer-I and Foster-I forms. 10
$Z(s) = (S^2 + 2)(S^2 + 6)/3S(S^2 + 5)$

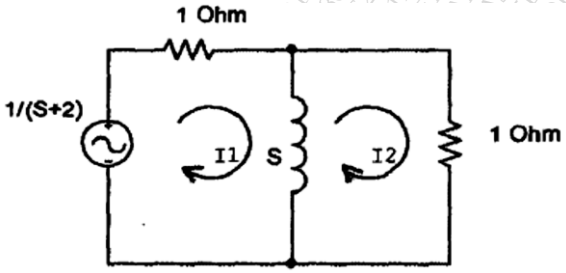
b) Obtain h parameters in terms of z parameters. 05

c) State and prove initial value theorem. 05

5. a) For the following network obtain the KVL equilibrium equation in matrix form using the concept of graph theory and hence find the link currents. 10



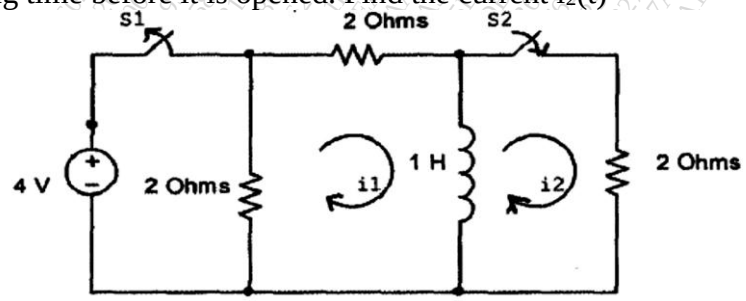

b) Find $I_2(S)$ for the following transformed circuit and hence find $i_2$ (t) using Inverse Laplace Transform. 05



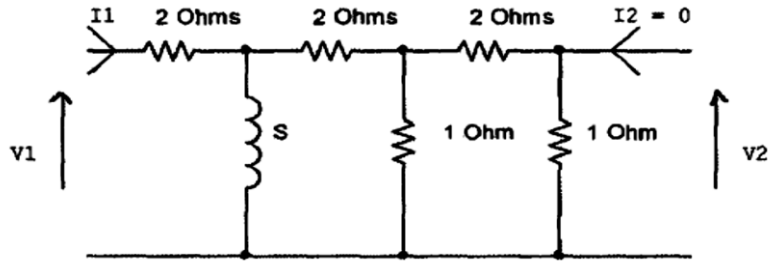

c) Test whether the following function is a Positive Real function. 05

$F(s) = (S^4+14S^2+45) / (S^3+7S)$

6. a) In the circuit given below, the switch $S_1$ is opened and the switch $S_2$ is closed at t=0. The switch $S_1$ was closed for a long time before it is opened. Find the current $i_2(t)$ 10




b) For the following ladder network find $V_2 / V_1$, $I_1 / V_1$ and $V_2 / I_1$ 10

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**Time : 3 Hours** **Max Marks: 80**

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

1. (A) Compare PAL and PLA. (05)
   (B) Define the following terms of Logic Families: (05)
   (i) Power Dissipation
   (ii) Figure of Merit
   (C) Prove the following using Boolean Algebra (05)
   $$AB + \bar{A}C = (A + C)(\bar{A} + B)$$
   (D) Compare Synchronous counter with Asynchronous counter. (05)

2. (A) Design synchronous counter using T-type flip flops for getting the following sequence: $1 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow 1$ (10)
   Take care of lockout condition.
   (B) Perform $(28)_{10} - (52)_{10}$ operation using 2's compliment method. (05)
   (C) Write $(32)_8$ into its Binary code, BCD code, and Hexadecimal code. (05)

3. (A) Implement the following Boolean equation using single 4:1 MUX and few logic gates: (10)
   $$F(P,Q,R,S) = \Pi M(0, 2, 5, 6, 7, 9, 12, 15)$$
   (B) Compare Combinational circuits with Sequential circuits. (05)
   (C) Implement a circuit having two inputs *A* and *B* and single output *Y* such that for any inputs of *A* and *B*, the output *Y* will always be 1 (i. e. $Y = 1$) using only NAND gates. (05)

4. (A) Draw a neat circuit of BCD adder using IC 7483 and explain. (10)
   (B) Using Quine McClusky method, minimize the following: (10)
   $$F(P,Q,R,S) = \sum m(1, 2, 3, 5, 9, 12, 14, 15) + d(4, 8, 11).$$

5. (A) Write VHDL code for negative edge triggered 3 bit binary down counter with active low Preset and Clear terminal. (10)
   (B) Convert JK type flip flop into D type flip flop. (05)
   (C) Compare SRAM with DRAM. (05)

6. (A) What is shift register? Explain any one type of shift register. Give its application. (10)
   (B) Design a Mealy type sequence detector circuit to detect a sequence 1101 using T type flip flops. (10)

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

1. **Question No. 1 is compulsory.**
2. **Out of remaining questions, attempt any three questions.**
3. **Assume suitable additional data if required.**
4. **Figures in brackets on the right hand side indicate full marks.**

Q.1 (A) Explain Static RAM. (05)

(B) Compare Moore and Mealy machines. (05)

(C) Which of the following expression is equivalent to $Z = \overline{\overline{A(\overline{AB})}.\overline{B(\overline{AB})}}$ ? (01)

i) $Z = A \oplus B$ ii) $Z = \overline{A \oplus B}$

iii) $Z = A + B$ iv) $Z = A.B$

Prove it. (04)

(D) Perform the following operation using 2's compliment

i) $(46)_{10} - (23)_{10}$ (02)

ii) $(23)_{10} - (46)_{10}$ (02)

Comment on results of (i) and (ii). (01)

Q.2 (A) Compare Combinational circuits with Sequential circuits. (05)

(B) Convert the following into BCD and Octal code (05)

i) $(AB)_{16}$ ii) $(118)_{10}$

(C) Draw and explain a neat circuit diagram of BCD adder using IC 7483. (10)

Q.3 (A) Minimize the following expression using Quine McClusky Technique (10)

$F(A,B,C,D) = \sum m(1,3,7,11,15) + d(0,2,5)$

(B) Implement the following function using single 8:1 Multiplexer. (10)

f(A,B,C,D)= $\sum$m(2,3,5,7,8,9,12,13,14,15)

Q.4 (A) What is excitation table? Explain the excitation table of SR flip flop. (05)

(B) Convert SR flip flop to JK flip flop. (05)

(C) What is shift register? Explain working of Serial In Serial Out. Give its applications. (10)

Q.5 (A) Simplify the following expression using Boolean algebra: (05)

Y(A,B,C) = $\sum$m(0,1,2,3,4,5,6,7)

(B) Represent the following Boolean expression by min/max terms (05)

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

(C) Design synchronous counter using D-type flip-flops for getting the following sequence: 0 – 2 – 4 – 6 – 0. Take care of lockout condition. (10)

Q.6 (A) Write VHDL code for 3:8 Decoder. (05)

(B) Compare FPGA and CPLD. (05)

(C) Design Full Adder circuit using PLA. (10)

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SE/Sem III/ EXTC/ CBGS/ Dec 18 17/12/18

Q. P. Code: 22929

(3Hours)

Total Marks: 80

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

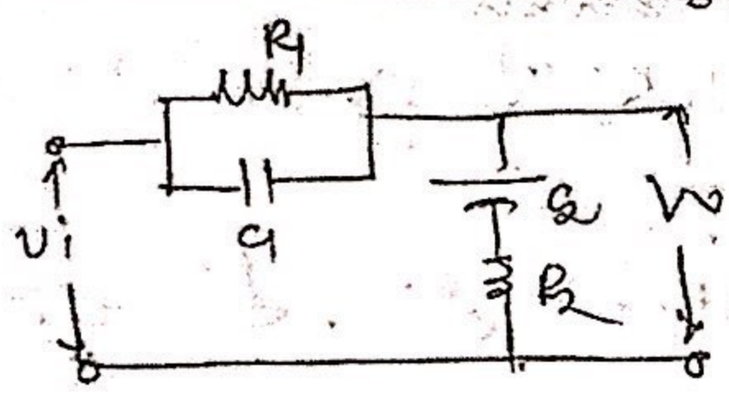
Q.1 **Solve any five**

a) Describe how Q Meter is used for measurement of low impedance. **(04)**

b) Explain various criteria for selection of transducers. **(04)**

c) Give basic block diagram of telemetry system and explain each component. **(04)**

d) Find transfer function for following system **(04)**

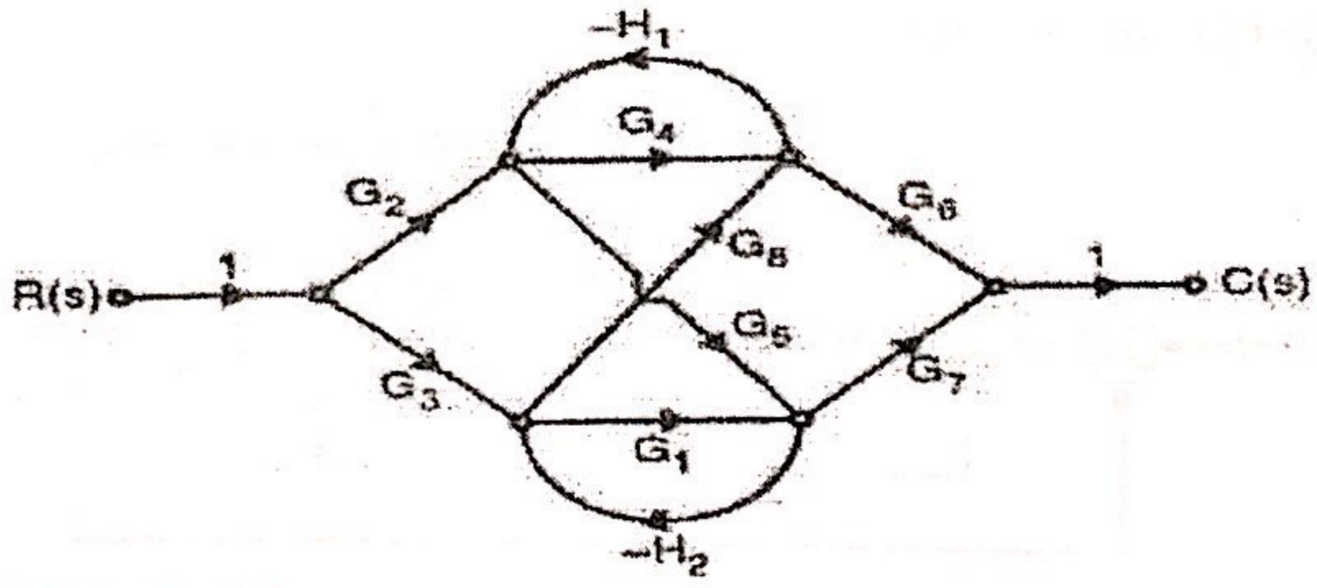



e) Explain concept of stability, absolute stability and conditional stability. **(04)**

f) Draw polar plot of **(04)**

$$G(s)H(s) = \frac{14}{s(s+1)(s+2)}$$

Q.2 a) 1)Find C(s)/R(s) using Mason's gain formula **(10)**




2) A unity feedback system has **(05)**

$G(s) = \frac{K}{s(s+2)(1+0.5s)}$. Find steady state error if r(t)=3t and K=4.Also calculate K for $e_{ss}$=0.4.

Q.2 b) What are the various sources of errors in Q meter? **(05)**

Q.3 a) A unity feedback system has **(10)**

$$G(S) = \frac{K}{S(S+1)(S+2)(S+4)}$$

Find the following using Routh –Hurwitz's criterion
1) the range of K for stability
2)The value of K for marginal stability

Q.3 b) Explain with neat diagram principle of operation of LVDT. An LVDT produces output of 5V; when the core displacement is 20mm from zero postion.Calculate core displacement when the output is 2.5V. **(10)**

Q.4 a) Draw the Bode Plot for a system having **(15)**
G(s) H(s) = 100/s(s+1)(s+2)
Find-
(a) Gain Margin
(b) Phase Margin
(c) Gain Crossover freq.
(d) Phase crossover freq.

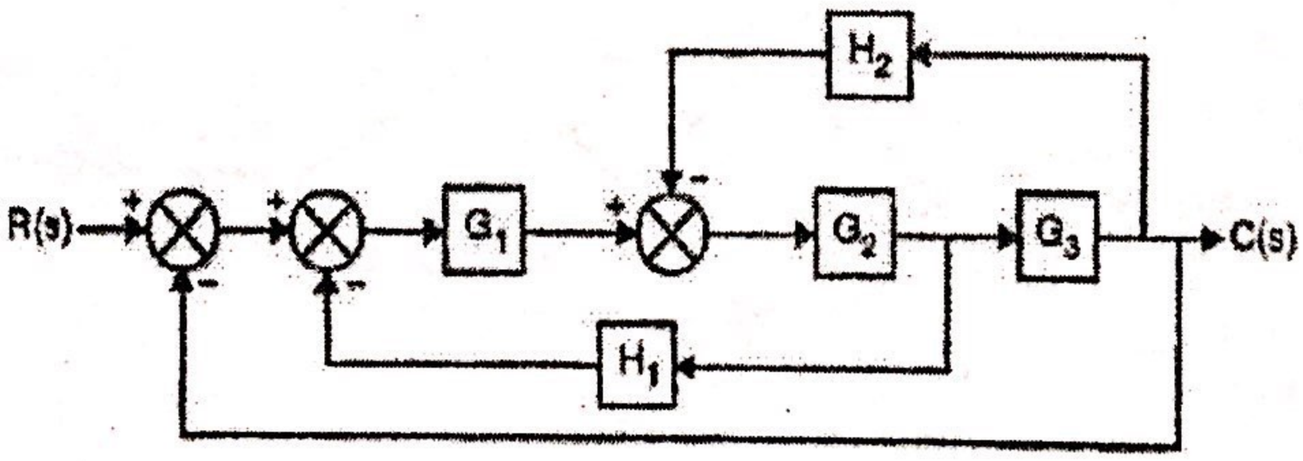
Q.4 b) Derive expression for inductance measurement using Hey Bridge. **(05)**

Q.5 a) Sketch root locus for the following transfer function **(10)**

$$G(S)H(s) = \frac{K}{S(S+4)(S+6)}$$

Q.5 b) Explain Kelvin's double bridge and its application in low resistance measurement and derive expression for unknown resistance. **(10)**

Q.6 a) Find C(s)/R(s) for the given system **(10)**




Q.6 b) 1) Define accuracy, precision and sensitivity with the help of examples. **(05)**
2) Draw generalized block diagram of data acquisition system and explain the blocks. **(05)**

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Time: 3hrs Total marks : 80

Note: i Attempt four questions, question no 1 is compulsory.

ii. Assume suitable data where ever required.

iii. Answers to the questions should be grouped together.

iv. Figure to the right of question indicates full marks.

Q1. Attempt any Four: 20

a) Explain working of RTD and mention its range.

b) Draw block diagram of generalised measurement system and explain its components

c) Write note on piezoelectric transducers.

d) Significance of three and half digit display

e) Explain Alternate mode and Chop mode in Dual trace oscilloscope

Q2. a. Define Q factor and explain working of Q meter for Q factor measurement 10

b. Draw and explain Kelvin's Double bridge and it's application in very low resistance measurement 10

Q3. a) Draw neat block diagram of CRO and explain its' function and comment on role of delay line in CRO. 10

b) Explain single and multichannel data acquisition system with neat diagram 10

Q4. a )Draw and explain Maxwell bridge and its application . 10

b) Define power and energy and explain working of a single phase energy meter. 10

Q5.a) Discuss DSO with the help of block diagram along with various modes of operation also explain its applications. 10

b) What are various A/D converting Techniques ? Explain any one in detail. 10

Q6. a) Explain Block diagram and application of wave analyzer 10

b) Draw and explain working of Capacitive transducer for level measurement. 10

S.E.(ELECTRONICS & TELE-COMMN)(Sem III) (Choice Based) / 51202 - ELECTRONIC DEVICES & CIRCUITS I

QP : Code : 25071

(3 Hours) [Total Marks : 80

Note: 1) Question no. 1 is compulsory.

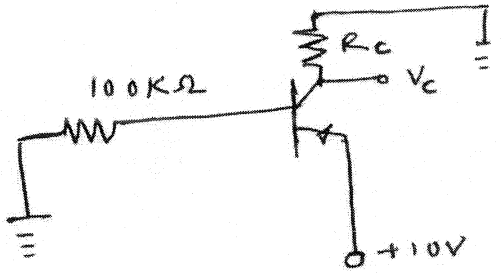
2) Solve any three questions out of remaining.

3) Fig. to the right indicates maximum marks.

4) Assume suitable data wherever necessary but justify the same.

**Q1.** Solve any five. (5x4 = 20)

a) Determine the value of Rc such that Vc = 5V and β = 50.

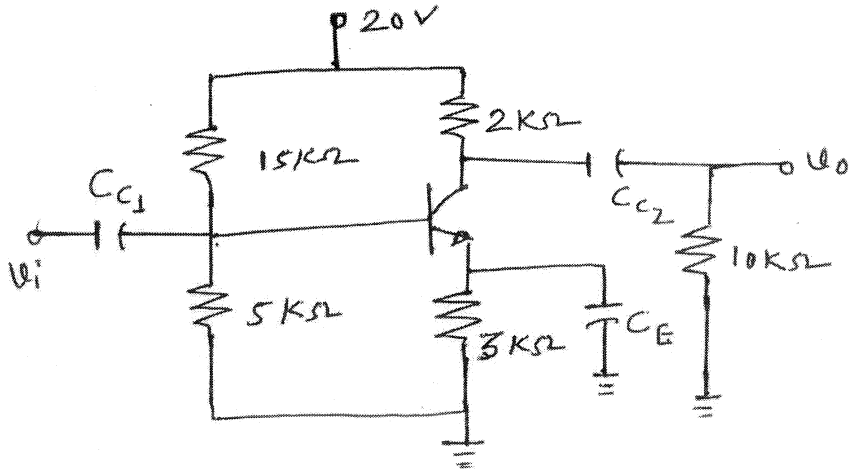



b) State and explain Miller's Theorem.

c) Design a self bias circuit using JFET for $I_D$ = 3mA, $V_{DD}$ = 20 V and $V_{DS}$ = 0.6 $V_{DD}$. ( $I_{DSS}$ = 8 mA, $V_P$ = -4V )

d) Explain various types of capacitors.

e) Determine the values of coupling capacitors $C_{C1}$ and $C_{C2}$ if $r_{\Pi}$ = 1.5KΩ, β = 120 and $f_L$=20Hz.

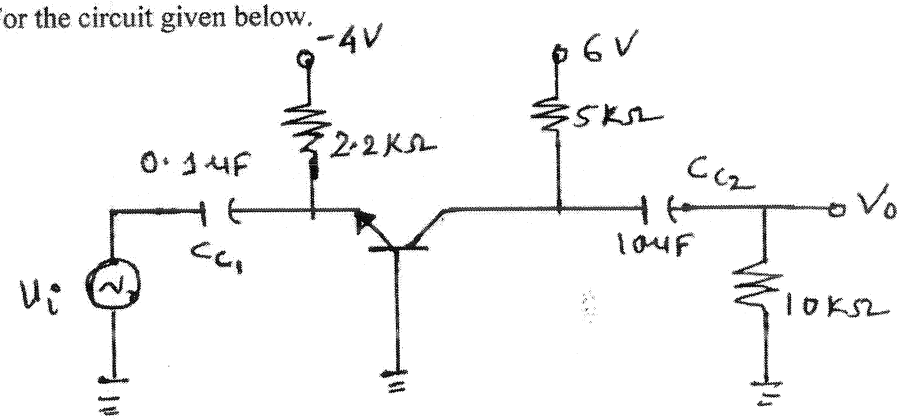



f) Explain concept of zero temperature drift in JFET.

[TURN OVER

**Q2. A)** Calculate 1) $I_{BQ}$ , $I_{CQ}$ 2) $g_m$, $r_\Pi$ 3) Small signal voltage gain **10**

For the circuit given below.



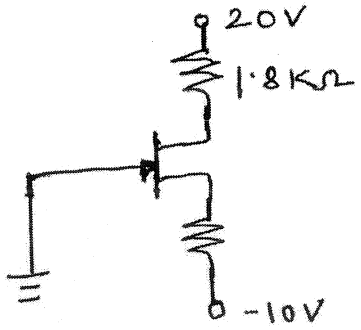

**Q2 B)** Explain the concept of LC filter in power supply circuit and hence derive **10**

expression for ripple factor of LC filter.

**Q3 A)** Explain concept of shunt Zener regulator. For a shunt Zener regulator giving **10**

output voltage of 10 V and load resistance varying from 5KΩ to 10KΩ, Vin is varying between 18V to 22V.
Find Rs, Pzmax, Sv and Ro.
Assume Rz = 4Ω and Izmin = 50μA.

**B)** Determine $I_{DQ}$, $V_{GSQ}$, $V_{DSQ}$ if $I_{DSS}$ = 9mA and $V_P$ = -3V for the circuit given below. **10**




**Q4 A)** Design capacitive filter with FWR using two diodes with ripple factor less than 5%. **10**

Output voltage is 24V and load current 200mA. The input line voltage of 230V/ 50Hz Is available.

**B)** Determine the values of biasing components for a CE configuration if Vcc = 12V, **10**
$V_{CE}$ = 6V, Rc=1KΩ, $V_{BE}$ = 0.6V, β = 180 for the following circuit.

i) Fixed bias without $R_E$

ii) Voltage Divider bias with $V_{RE}$ = 10% of Vcc and $S_I$ = 8

[TURN OVER

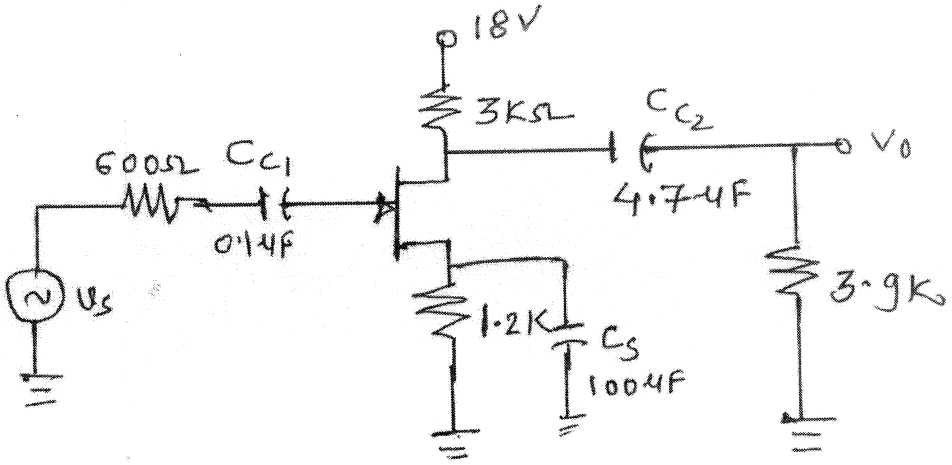
**Q5 A)** For JFET if $I_{DSS}$ = 6 mA, $V_P$ = -6V rd =∞, Cgd = 4pF, Cgs = 6pF, Cds = 1pF **15**

Determine i) $V_{GSQ}$ ii) $I_{DQ}$

iii)gmo iv) gm

v) Midband voltage gain Av

vi) Higher cut off frequency




**B)** Explain high frequency ∏ equivalent model of common emitter BJT. **5**

**Q6.** Design single stage CS amplifier using mid-point biasing method for voltage gain of 12, **20**

$F_L$ =20 Hz, $R_L$ = 10KΩ, Vo = 3.5V

(Use JFET parameters $I_{DSS}$ = 7mA, $V_P$ = -2.5V, gmo = 5600μ℧, rd = 50KΩ )

Paper / Subject Code: 40805 / Principles of Communication Engineering 14/12/18

Semester Exam - CBCGS, Dec 18

Q.P.Code: 39182

(3 Hours) Total Marks : 80

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

(2)Attempt any three questions out of remaining five.

(3)Figures to the right indicate full marks.

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

1. Solve any four 20

(a) Modulation Index for AM should be less than one. Justify/Contradict.

(b) What is aliasing? How it can be prevented?

(c) Why AGC is required in radio receivers?

(d) Justify, why FM is more immune to noise?

(e) Define noise figure and noise factor.

2. (a) State and prove sampling theorem for low pass bandlimited signals. 10

(b) One input to AM modulation is 800 KHz carries with an amplitude of 10 Vp. The second input is 10KHz modulating signal that is of sufficient amplitude to cause a change in o/p wave of ± 5.5Vp. Determine. 10

i) Upper and lower side frequency

ii) Modulation co-efficient and percent modulation

iv) Draw o/p frequency spectrum

v) Draw modulated wave showing maxima and minima of waveforms

3. (a) Explain the operation of Foster seeley discriminator with the help of circuit diagram and phasor diagram. 10

(b) Explain the working of stabilized reactance modulator with suitable diagram. 10

4. (a) With help of neat diagram and waveforms explain generation and demodulation of PWM 10

(b) Explain phase shift method for suppression of unwanted carrier with neat block diagram. 10

5. (a) Explain the following with reference to AM receiver **10**

(i) Double spotting

(ii) Three point tracking

(iii) Image frequency rejection ratio

(iv) Fidelity

(b) Explain Indirect FM transmitter with suitable diagram. **10**

6. Write short note on(any four) **20**

(a) Vestigial side band transmission (VSB) and its application.

(b) μ-law and A-law companding

(c) Frequency division Multiplexing (FDM)

(d) Amplitude limiting and thresholding

(e) Pre emphasis and de-emphasis circuits and its need

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