S.E. Extc Sem III (CBSU). 3/6/16.

CTL

QP Code : 30754

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

N.B. : (1) **Attempt** questions **No. 1** and **any 3** from remaining questions. In all **4** questions are to be attempted.
(2) **All** sub-questions of the **same** question should be answered at **one** place only in their serial orders, and not scattered.
(3) **Assume** suitable **data** with **justification** if missing.

1. (a) Determine Y - parameters for the network shown in fig 1 (a) 5

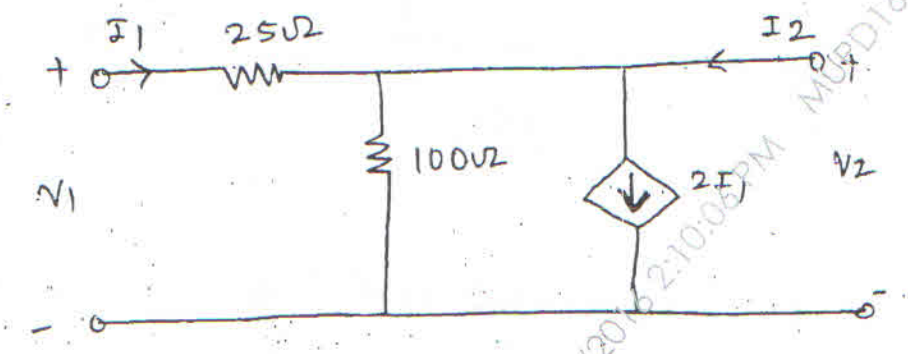

Fig 1 (a)

(b) Test if $F(s) = S^4+S^3+5S^2+3S+4$ is a Hurwitz polynomial. 5

(c) Two coils connected in series have self inductance 80 mH & 20 mH respectively The total inductance of the circuit is found to 140 mH. Determine the 5
(i) mutual inductance between two coils and
(ii) The coefficient of coupling

(d) Synthesize the following function into a network. 5

$$z(s) = \frac{s^2+2s+2}{s^2+s+1}$$ using cauer -1 form.

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2. (a) Find the Thevenin's equivalent across the terminals XY for the circuit shown in fig 2 (a) 10

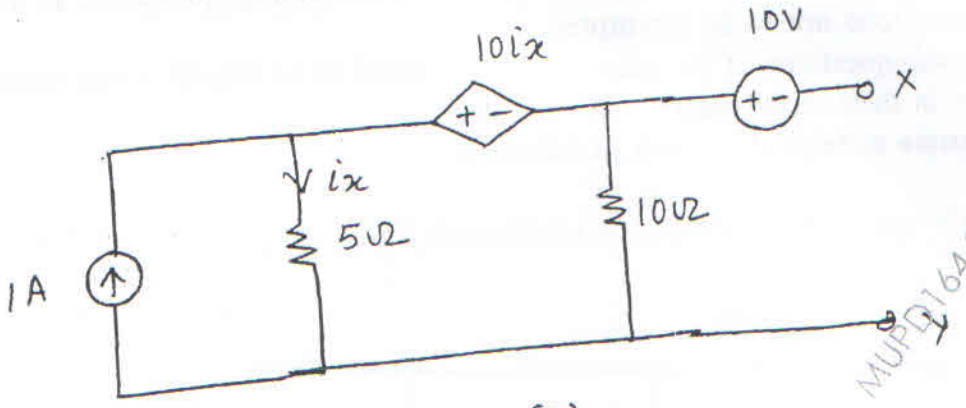

Fig 2(a)

(b) Determine the node voltage at node (1) & (2) of the Network Shown in fig 2(b) by using nodal analysis. 5

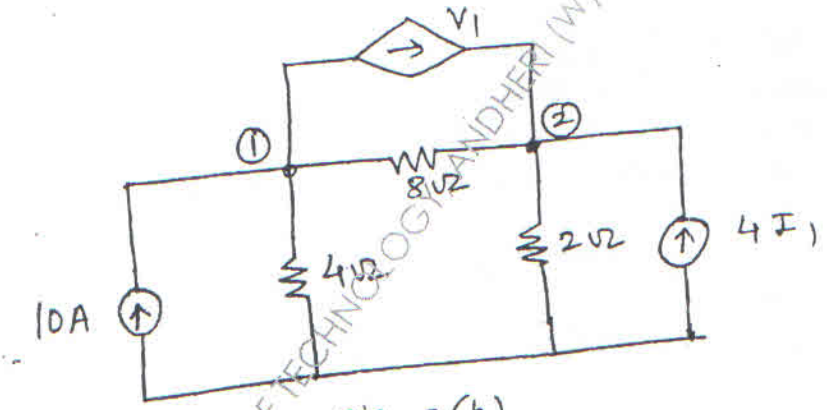

Fig 2(b)

5

(c) Test Whether

$$F(s)=\frac{s(s+3)(s+5)}{(s+1)(s+4)}$$ is a positive real function.

3. (a) Synthesize the driving point function using Foster -I and Foster -II form. 10

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

(b) State and prove Initial value theorem. 5

(c) A Transmission line has distributed parameters R=6 Ohms / km, L= 2.2 mH/km 5
C=0.005 μF /km & G = 0.005 μmho/km
Determine characteristics impedance and propagation constant at 1KHz frequency.

4. (a) Find ABCD parameters for the two port Network shown in fig 4 (a). 10

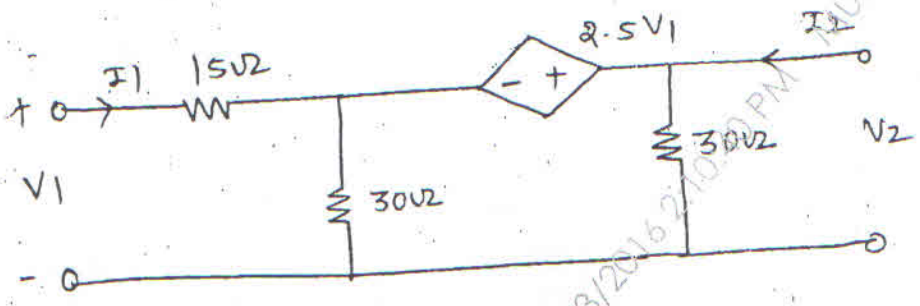

Fig 4 (a)

(b) Find the Network functions $\frac{V_1}{I_1}, \frac{V_2}{I_1}, \frac{V_2}{V_1}$ for the network shown in fig 4 (b) 5

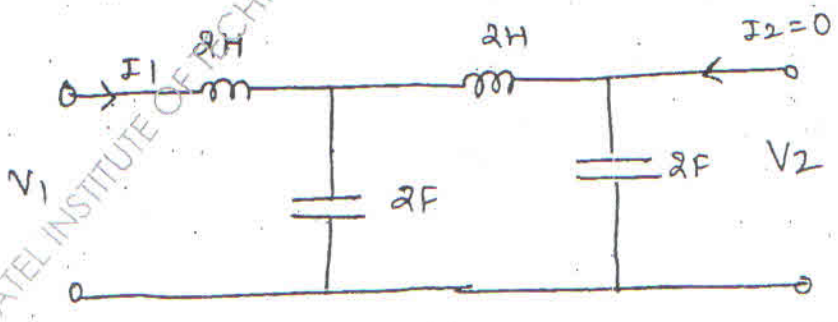

Fig 4(b)

(c) A Transmission line has a characteristics impedance of 50+j 100 Ω and is terminated in a load impedance of 73 - j 42. 5 Ω Calculate 5

(a) The reflection coefficient.

(b) The standing wave ratio

5. (a) The Network shown in fig 5 (a), switch K is closed at t = 0, Assume all initial conditions as zero. Find $i, \frac{di}{dt} \& \frac{d^2i}{dt^2}$ at $t = 0^+$ 10

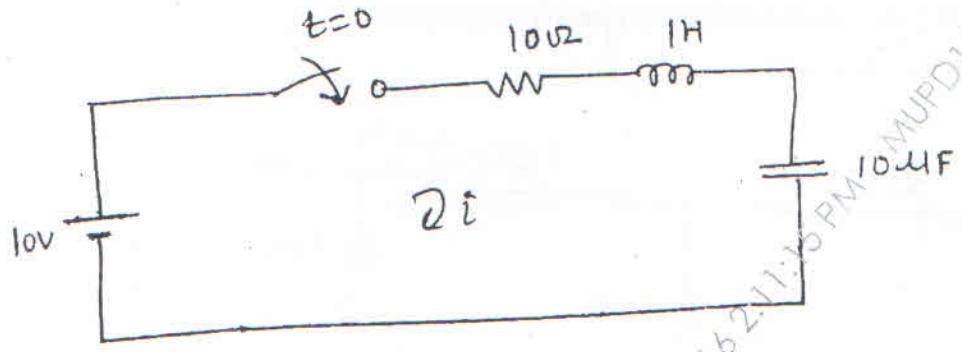

Fig 5(a)

(b) Write the KVL equations in standard form for the N/W shown in fig 5(b) 5

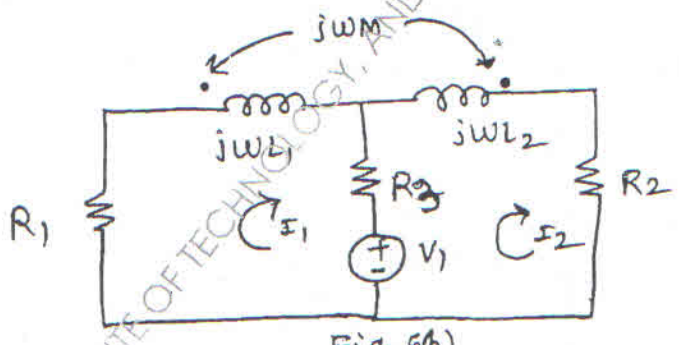

Fig 5(b)

(c) Find poles and zero of the Impedance Z(s) for the Network Shown in fig 5 (c) 5

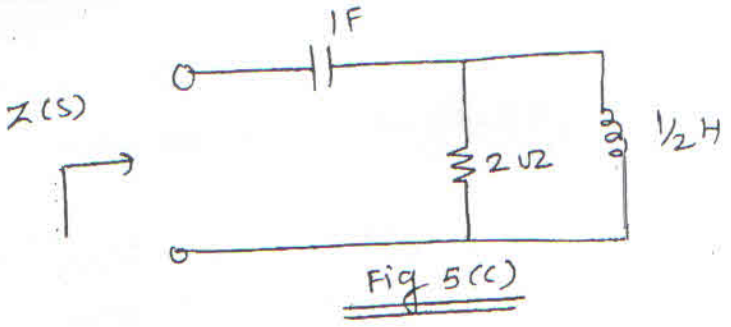

Fig 5(c)

6. (a) Why is the Impedance matching required? Draw the following normalized quantities on the smith chart. 10

(i) (3+i3) Ω (ii) (1.0) Ω

(iii) (2-j1) Ω (i) j 1.0 Ω

(b) Write short note on : 5

Time domain analysis using Laplace Transform.

(c) Define the following terms 5

(i) Phase Velocity

(ii) Characteristic impedance

(iii) Reflection coefficients

S.E. Extc (III) (CBGS).

EIM

30/5/16.

QP Code : 30714

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

N. B. : (1) Question No.**1** is **compulsory**.
(2) Out of remaining question, attempt any **three** questions.
(3) Assume suitable additional data if required.
(4) **Figure** to the **right** of question indicates **full** marks.
(5) Write your answers in ink only.

1. Attempt any **four**: **20**
   (a) Explain Alternate mode and Chop mode in a dual trace oscilloscope.
   (b) What is cold junction compensation in thermocouples.
   (c) Write a note on piezoelectric transducer.
   (d) Which is fastest ADC and why?
   (e) Define accuracy, precision and sensitivity with suitable example.
   (f) Compare Analog instrument with Digital Instrument.

2. (a) Explain the principle, working and construction of LVDT. What is meant by residual voltage? **10**
   (b) Draw neat block diagram of Dual Beam Oscilloscope. Give the comparison between Dual Trace and Dual Beam Oscilloscope. **10**

3. (a) What are the various D/A Converting Techniques? Explain any one technique. **10**
   (b) What is the basic principle of wave analyser? Explain heterodyne type wave analyser with application. **10**

4. (a) Explain Kelvin's double bridge and its application in very low resistance measurement. **10**
   (b) Draw and discuss Hey Bridge and its application for measurement of inductance. **10**

5. (a) Explain the principle and working of operation of dual slope DVM. **10**
   (b) Define Q factor and explain working of a Q meter for Q factor measurement. **10**

6. (a) Draw block diagram for generalised measurement system and explain its components. **5**
   (b) List various sensors for pressure and temperature along with their ranges. **5**
   (c) Brief out classification of errors in measurements. **5**
   (d) Explain electrodynamometer type watt meter. **5**

Sem III EXTC (CBGS) 24/5/16.

Digital Electronics

QP Code : 30666

(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 Combinational circuits with Sequential circuits.	(05)
	(B)	Compare Synchronous with Asynchronous counter.	(05)
	(C)	Compare TTL with CMOS logic families.	(05)
	(D)	Compare PLA with PAL.	(05)
2.	(A)	Write the VHDL code for 2-bit up-down counter with positive edge triggered clock.	(10)
	(B)	State and prove the De Morgan's theorem.	(05)
	(C)	Draw the block diagram of internal architecture of XC4000 family FPGA.	(05)
3.	(A)	Design synchronous counter using T-type flip flops for getting the following sequence: $0 \rightarrow 2 \rightarrow 4 \rightarrow 6 \rightarrow 0$. Take care of lockout condition.	(10)
	(B)	Convert T-type flip flop into D-type flip flop.	(05)
	(C)	Write $(AB)_{16}$ into its BCD code and Octal code.	(05)
4.	(A)	Implement the following Boolean equation using single 4:1 MUX and few logic gates: $F(P,Q,R,S) = \prod M(0, 2, 5, 6, 7, 9, 12, 15)$.	(10)
	(B)	Compare FPGAs with CPLDs.	(05)
	(C)	Implement $Y = A + \overline{B}C$ using only NOR gates.	(05)
5.	(A)	Draw a neat circuit of BCD adder using IC 7483 and explain.	(10)
	(B)	Using Quine McClusky method, minimize the following: $F(P,Q,R,.S) = \sum m(0,1,3,7,8,9,15) + d(2,10,11)$.	(10)
6.	(A)	Design a Mealy type sequence detector circuit to detect a sequence 1101 using T-type flip flops.	(10)
	(B)	What is shift register? Explain any one type of shift register. Give its application.	(10)

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Sem-III EXTC (CBGS) 12/5/16.

Analog Electronics-I

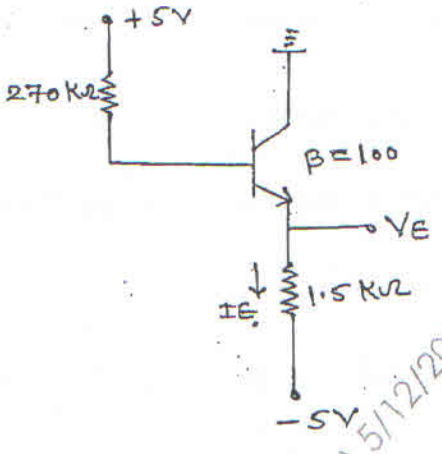
QP Code : 30569

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

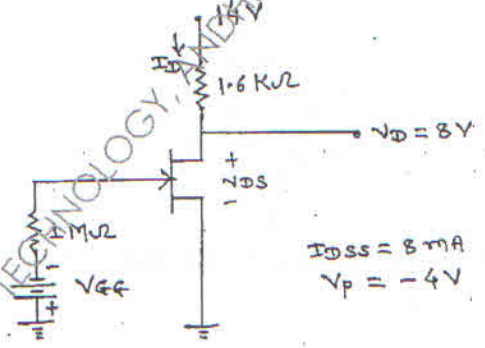
N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any three questions out of remaining five questions.
(3) Assume suitable data if required and mention the same in answer sheet.

1. Attempt **any five** questions :- 20

(a) Find V_E and I_E for the circuit given below.



(b) For the circuit given below find I_D, V_{DS}, V_{GG}



(c) Write down current equation of diode and explain significance of each parameters.

(d) Explain the concept of thermal runaway in BJT.

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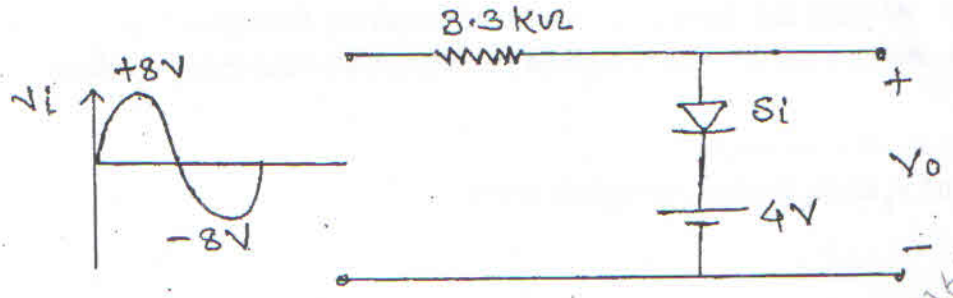
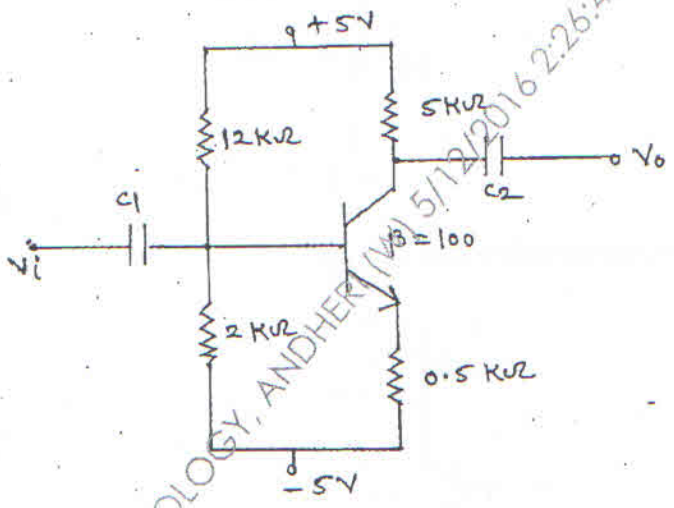
(e) Draw the output Waveform Vo for circuit shown.



(f) State and explain Barkhausen's criteria for oscillations.

2. (a) Determine Q-Print and draw d.c. load line for the amplifier shown. 10

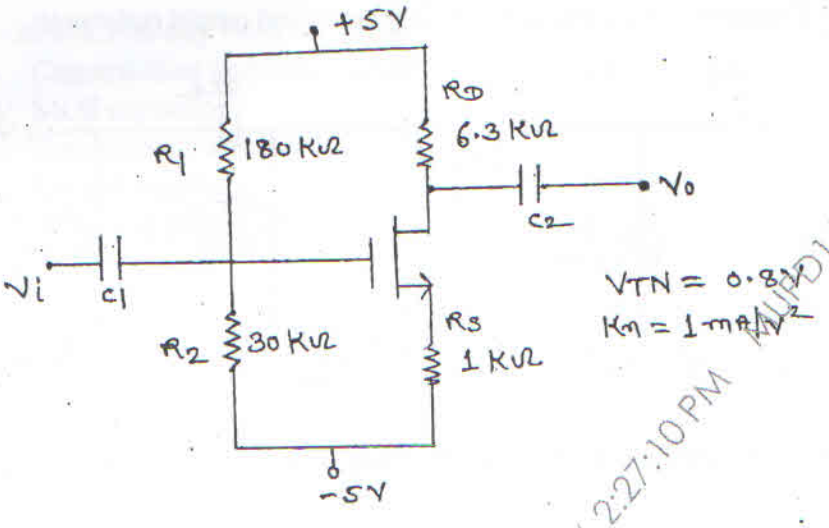


(b) Derive the expression for frequency of oscillation for a BJT RC phase shift oscillator. 10

Sem III EXTC (CBGS)
Analog Ele

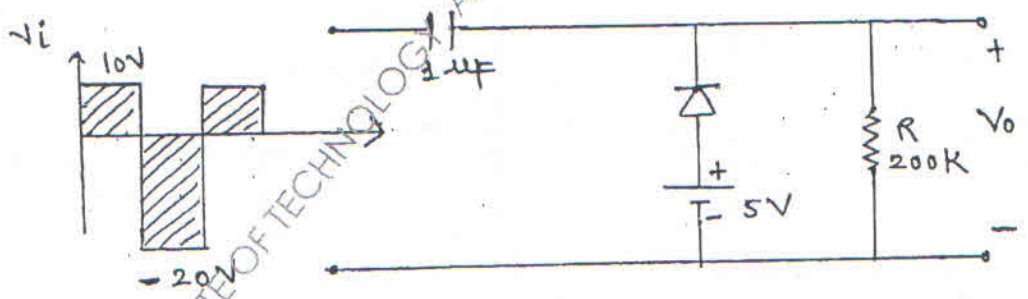
QP Code : **30569**

3. (a) Determine voltage gain, Input resistance and output resistance for the MOSFET amplifier shown. **10**



(b) Explain the working and characteristics of n-channel Junction Field Effect Transiators (JFET) **10**

4. (a) Draw the output waveform V_0 for ckt shown if (i) Vr = 0V (ii) Vr = 0.7v where Vr is cutin voltage of diode. **10**



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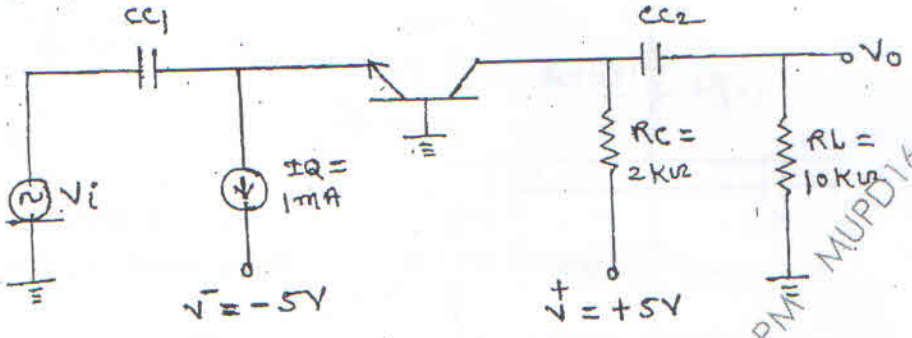
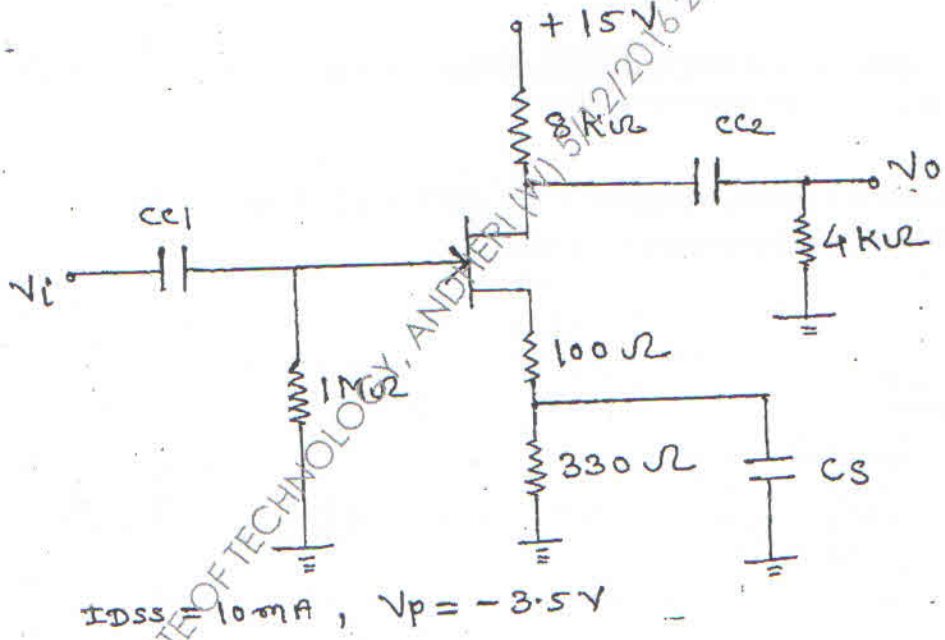
(b) For the common base circuit shown, the transistor has parameters $\beta = 120$ and $V_A = \infty$ 10

(i) Determine the quiescent V_{CEQ}

(ii) Determine the small signal voltage gain and output resistance.



5. (a) For the Amplifier shown determine (i) Q point (ii) Av, Zi, Zo 10



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Sem-III EXTC
A.E-I

(b) Derive expressions for voltage gain, input resistance and output resistance for source follower circuit using n-channel MOSFET. **10**

6. Write short notes on **any Four** :- **20**
   (i) Construction and operation of varactor diode
   (ii) MOS capacitor
   (iii) Transistor as a switch
   (iv) Crystal oscillator
   (v) Hybrid-π model of BJT

Sem-III (ETRx & EXTC) 18/5/16

Applied Maths-III

QP Code : 30598

(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 $\int_0^\infty e^{-2t}\left(\frac{\sinh t \sin t}{t}\right)dt$ 05

(b) Obtain the Fourier Series expression for $f(x)=9-x^2$ in (-3,3) 05

(c) Find the value of 'p' such that the function f(z) expressed in polar co-ordinates as $f(z)=r^3\cos p\theta + ir^p \sin 3\theta$ is analytic. 05

(d) If $\overline{F}=(y^2-z^2+3yz-2x)\hat{i}+(3xz+2xy)\hat{j}+(3xy-2xz+2z)\hat{k}$.
Show that $\overline{F}$ is irrotational and solenoidal . 05

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

$\frac{d^2y}{dt^2}+4\frac{dy}{dt}+8y=1$, given y(0)=0 and y'(0)=1

(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) Find the directional derivative of 08
$\phi=4xz^3-3x^2y^2z$ at (2,-1,2) in the direction of $2\hat{i}+3\hat{j}+6\hat{k}$.

ii) If $\bar{r}=x\hat{i}+y\hat{j}+z\hat{k}$
Prove that $\nabla \log r=\frac{\bar{r}}{r^2}$

Sem-III (ETRx & EXTC) 18/5/16

Applied Maths-III

QP Code : 30598

(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 $\int_0^\infty e^{-2t}\left(\frac{\sinh t \sin t}{t}\right)dt$ 05

(b) Obtain the Fourier Series expression for $f(x)=9-x^2$ in (-3,3) 05

(c) Find the value of 'p' such that the function f(z) expressed in polar co-ordinates as $f(z)=r^3\cos p\theta + ir^p \sin 3\theta$ is analytic. 05

(d) If $\bar{F}=(y^2-z^2+3yz-2x)\hat{i}+(3xz+2xy)\hat{j}+(3xy-2xz+2z)\hat{k}$.
Show that $\bar{F}$ is irrotational and solenoidal . 05

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(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) Find the directional derivative of 08
$\phi=4xz^3-3x^2y^2z$ at (2,-1,2) in the direction of $2\hat{i}+3\hat{j}+6\hat{k}$.

ii) If $\bar{r}=x\hat{i}+y\hat{j}+z\hat{k}$
Prove that $\nabla \log r=\frac{\bar{r}}{r^2}$

3. (a) Show that $\{\cos x, \cos 2x, \cos 3x.....\}$ is a set of orthogonal functions over $(-\pi, \pi)$ .Hence construct an orthonormal set. 06

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

$$u = \frac{x}{2}\log(x^2+y^2) - y\tan^{-1}\left(\frac{y}{x}\right) + \sin x \cosh y$$ 08

(c) Find Laplace transform of

i) $\int_0^t ue^{-3u}\cos^2 2u\,du$

ii) $t\sqrt{1+\sin t}$ 06

4. (a) Find the Fourier Series for

$f(x) = \frac{3x^2 - 6\pi x + 2\pi^2}{12}$ in $(0, 2\pi)$

Hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2}..... = \frac{\pi^2}{6}$ 06

(b) Prove that

$$\int_0^b xJ_0(ax)dx = \frac{b}{a}J_1(ab)$$ 08

c) Find

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

ii) $L^{-1}\left[\left(\frac{s+2}{s^2-2s+17}\right)\right]$

5. (a) Obtain the half range cosine series for 06

$$f(x) = x, 0 < x < \frac{\pi}{2}$$
$$= \pi - x, \frac{\pi}{2} < x < \pi$$

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

(c) Verify Green's Theorem for $\int_C \overline{F}.\overline{dr}$ where 08

$\overline{F} = (x^2 - xy)\hat{i} + (x^2 - y^2)\hat{j}$ and C is the curve bounded by $x^2 = 2y$ and $x = y$

6.(a) Show that the transformation 06

$w = \frac{i - iz}{1 + z}$ maps the unit circle $|z| = 1$ into real axis of w plane.

(b) Using Convolution theorem find 06

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

(c) 08

i) Use Gauss Divergence Theorem to evaluate $\iint_S \overline{F}.\hat{n}ds$ where $\overline{F} = x\hat{i} + y\hat{j} + z\hat{k}$ and S is the sphere $x^2 + y^2 + z^2 = 9$ and $\hat{n}$ is the outward normal to S

ii) Use Stoke's Theorem to evaluate $\int_C \overline{F}.\overline{dr}$ where $\overline{F} = x^2\hat{i} - xy\hat{j}$ and C is the square in the plane z=0 and bounded by x=0,y=0,x=a and y=a.