DECEMBER 2019

EXAMINATION TIME TABLE

PROGRAMME - S.E. (Electronics & Telecommunication) (REV. -2012) (CBSGS)

SEMESTER - III

Days and Dates	Time	Paper Code	Paper
Thursday, November 14, 2019	02:30 p.m. to 05:30 p.m.	49601	ANALOG ELECTRONICS - I
Monday, November 18, 2019	02:30 p.m. to 05:30 p.m.	49602	APPLIED MATHEMATICS-III
Wednesday, November 20, 2019	02:30 p.m. to 05:30 p.m.	49603	DIGITAL ELECTRONICS
Friday, November 22, 2019	02:30 p.m. to 05:30 p.m.	49604	ELECTRONIC INSTRUMENTS & MESUREMENTS
Tuesday, November 26, 2019	02:30 p.m. to 05:30 p.m.	49605	CIRCUITS AND TRANSMISSION LINES

Duration: 3hrs **Max. Marks:80**

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 Compare JFET and MOSFET **5**

b Explain the Significance of stability factor **5**

c Why crystal oscillator is most stable oscillator? **5**

d Describe thermal runaway in BJT **5**

e What is clipping and clamping explain with one example. **5**

Q.2

a Draw BJT CE amplifier with any biasing circuit and derive expression for voltage gain, input impedance and output impedance. **10**

b What is Varctor diode? Explain construction and operation of varactor diode. **10**

Q.3

a Sketch the circuit of Wein Bridge Oscillator using BJT and derive an expression for the frequency of oscillation. **10**

b For Common source amplifier with N-channel E0MOSFET determine A_V, Zi, and Zo. V_{DD}=21V,R_1=42K,R_2=33K, R_D=5K, R_S=1.5K. The MOSFET parameters are: V_{TN}=1.5V, Kn=0.5mA/V^2 **10**

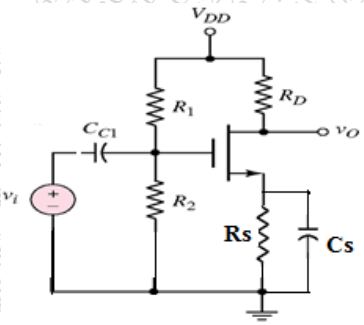

Fig.2

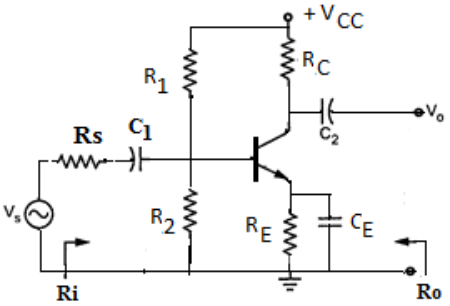

Fig.3

Q.4 a For the amplifier shown in Fig.3 analyze and determine. Derive the expression for small-signal voltage gain, input and output impedance. BJT and circuit parameters are: $\beta = 100, V_{BE} = 0.7V, V_A = 100V$ .R_1=93.7K, R_2=6.3k, R_C=6K, R_S=0.5K, V_{CC}=12V. **10**

b Draw the constructional diagram of N-Channel JFET, and explain the operation and thus obtain the V-I characteristics. **10**

Q.5

a An N-Channel FET with common drain amplifier shown in fig.4 has the following parameters: I_{DSS}=10mA, at V_P=-4V. Determine Small signal voltage gain, input impedance and output impedance. If R_1=10M, R_2=2M, V_{DD}=18V, R_S=1.2k, R_L=10K. **10**

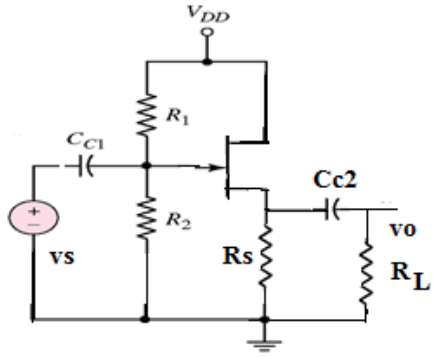

Fig.4

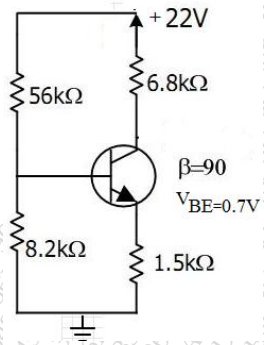

Fig.5

b For the circuit shown in figure 5. Determine Q point co-ordinates. **10**

Q.6 Attempt the following

a) LC oscillator and its application. **5**

b) Small signal h- parameter parameters of BJT **5**

c) Depletion MOSFET operation. **5**

d) Compare BJT and FET **5**

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(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 cost cos2t cos3t 05

b) Show that the set of functions cosnx, n= 1,2,3,……. is orthogonal over $(0 , 2\pi)$ 05

c) Prove that $f(z) = (x^3 – 3xy^2 + 2xy) + i(3x^2y – x^2 + y^2 – y^3)$ is analytic and find $f^I(z)$ in terms of z . 05

d) Find the directional derivative of $\varphi = x^2+y^2+z^2$ in the direction of the line $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$ at (1, 2, 3) 05

Q.2 a) Find the fourier series for $f(x) = x^2$ in $(0 , 2\pi)$ 06

b) Show that the vector $\bar{F} = (x^2 + xy^2)\, i + (y^2 + x^2y)\, j$ is irrotational and find its scalar potential 06

c) Prove that the transformation $w = \frac{1}{z+i}$ transforms real axis of z- plane into a circle of w – plane 08

Q.3 a) Using convolution theorem, find inverse Laplace transform of $\frac{s^2}{(s^2+2^2)^2}$. 06

b) Prove that $J_{5/2}(x) = \sqrt{\frac{2}{\pi x}}\left(\frac{3-x^2}{x^2}\sin x - \frac{3}{x}\cos x\right)$ 06

c) Find half range cosine series for $f(x) = x(\pi - x)$, $0<x<\pi$. Hence show that $\sum_1^\infty \frac{1}{n^4} = \frac{\pi^4}{90}$ 08

Q.4 a) Evaluate by Green's theorem $\int_c (e^{x^2} - xy)\,dx - (y^2 - ax)dy$ where c is the circle $x^2 + y^2 = a^2$. 06

b) Prove that $2J_0''(x) = J_2(X) - J_0(x)$. 06

c) i) Evaluate $\int_0^\infty \frac{e^{-t} - e^{-3t}}{t}$ dt 08

ii) Find Laplace transform of $t\sqrt{1 + sint}$

Q.5 a) Find the orthogonal trajectory of the family of curves $x^3y - xy^3 = c$. 06

b) Prove that $\int x \cdot J_{2/3}(x^{3/2})\,dx = -\frac{2}{3}x^{-1/2}J_{-1/3}(x^{3/2})$. 06

c) Obtain complex form of Fourier Series for $f(x) = e^{2x}$ in (0, 2). 08

Q.6 a) Use stoke's Theorem to evaluate $\int_c \bar{F} \cdot d\bar{r}$ where $\bar{F} = yz\,i + zx\,j + xy\,k$ and C is the boundary of the circle $x^2 + y^2 + z^2 = 1$ and $z = 0$. 06

b) Find the fourier integral representation for 06

$f(x) = e^{ax}$, $x \leq 0$, $a > 0$

$= e^{-ax}$, $x \geq 0$, $a > 0$

Hence show that $\int_0^\infty \frac{\cos wx}{w^2 + a^2}\,dx = \frac{\pi}{2a}e^{-ax}$, $x > 0$, $a > 0$

c) Solve using Laplace transform $(D^2 + 2D + 5)y = e^{-t}sint$, where $y(0) = 0$, $y'(0) = 1$. 08

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

N:B:

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) Perform following subtraction using 2's compliment. **[5]**
i) $(44)_{10} - (66)_{10}$ ii) $(76)_{10} - (34)_{10}$
b) Define Noise margin, Propagation delay and Power dissipation. **[5]**
c) Compare combinational circuits and sequential circuits. **[5]**
d) Compare TTL and CMOS logic. **[5]**

Q.2 a) Simplify following expression using K-map and implement using only NOR gates. $F(A,B,C) = \sum m\ (1,4,5,6,7)$ **[10]**
b) Convert D flip flop to T flip flop. **[05]**
c) Explain race around condition in JK flip flop. **[05]**

Q.3 a) Minimize the following expression using Quine McClusky Technique $F(A,B,C,D) = \sum m\ (2,3,6,7,8,9,13,15)$ **[10]**
b) Design full adder using logic gates. **[10]**

Q.4 a) Design mod-10 ripple up counter using JK flip flop. Draw its timing diagram. **[10]**
b) Implement the following function using single 8:1 Multiplexer and logic gates. $F(A, B, C, D) = \sum m\ (0,1,2,4,5,6,8,9,10,12,13,15)$. **[10]**

Q.5 a) Explain the various features of VHDL and its modelling style. **[10]**
b) Design mod-5 synchronous up counter using T flip flop. **[10]**

Q.6 a) Write short note on FPGA. **[10]**
b) What is shift register? Explain any one type of shift register. **[10]**

Time: 3hrs 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 any **four:** **20**
   (a) Draw block diagram for generalized measurement system and explain its components.
   (b) Explain the working of straingauge and its application in load measurement.
   (c) Significance of four and half digit display.
   (d) List names of bridges for RLC measurement with proper classification
   (e) Brief out classifications of errors in measurement

2. (a). Explain with neat diagram the working principal of LVDT. Give its applications 10

   (b). Describe how Q meter is used for the measurement of low impedance. What are various sources of errors in Q Meter 10

3. (a). Explain Kelvin's Double bridge and its application in very low resistance measurement 10

   (b). Draw neat block diagram of CRO and explain its functioning. Comment on role Sweep in CRO 10

4. (a). Discuss DSO with the help of block diagram along with various modes of operation. Also explain its applications 10

   (b). What is the basic principal of wave analyzer and explain Heterodyne type wave analyser and its applications 10

5. (a) Draw and explain weighted resistor network type DAC for 3 bits input taking suitable example 10

   (b) Draw and discuss Maxwell bridge and its applications for measurement of inductance 10

6. (a) Explain single and multichannel data acquisition system with neat labelled separate block diagram 10

   (b) Compare the temperature transducers, RTD, Thermistors and thermocouples on the basis of principle, characteristics ,range and applications 10

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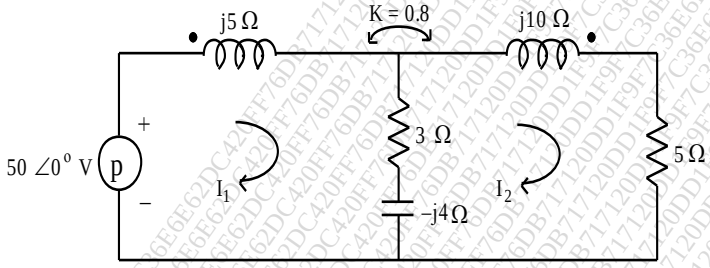
Q.P. Code : 50501

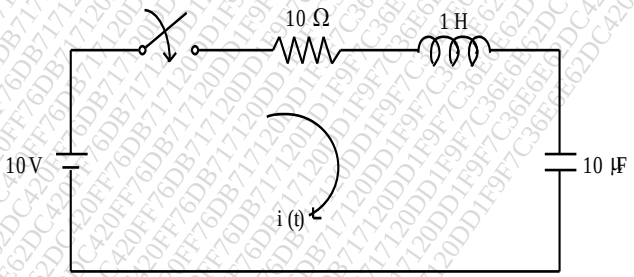
[Time: Three Hours] **[Marks:80]**

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 network shown in Fig., switch is closed. Assuming all initial conditions as zero, find i and $\frac{di}{dt}$ at t = 0+. 05

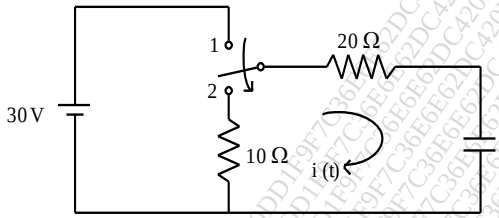


(C) In the two port network shown in Fig., compute h-parameters from the following data : 05

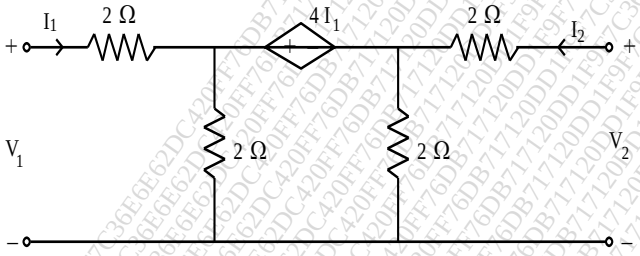
(a) With the output port short circuited : $V_1 = 25$ V, $I_1 = 1$ A, $I_2 = 2$ A
(b) With the input port open circuited : $V_1 = 10$ V, $V_2 = 50$ V, $I_2 = 2$ A

(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

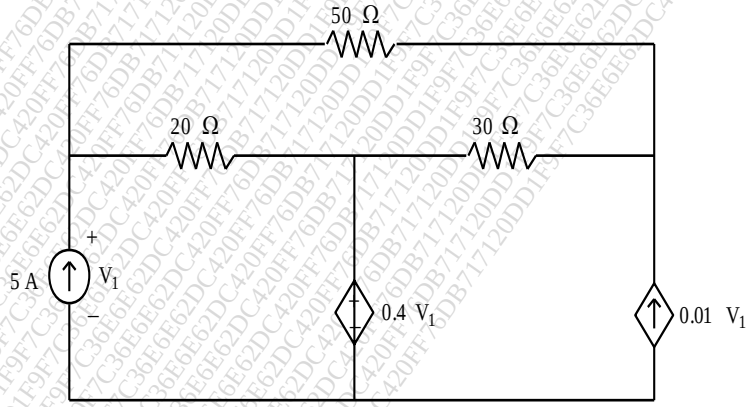
2 (A) In the network shown in Fig., switch is changed from position 1 to position 2 at t = 0, steady condition having reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d2i}{dt2}$ at t = 0+. 10



(B) Find Z and h-parameters for the network shown in Fig. 10



3 (A) Find the power supplied by the dependent voltage source. 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

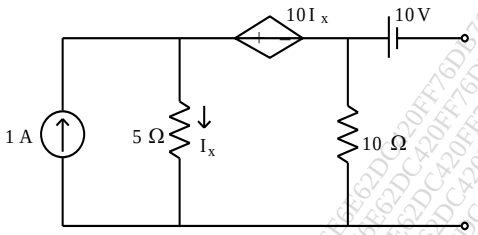
i) Characteristic Impedance
ii) Propagation Constant
iii) Attenuation Constant
iv) Phase Constant at 1 kHz

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

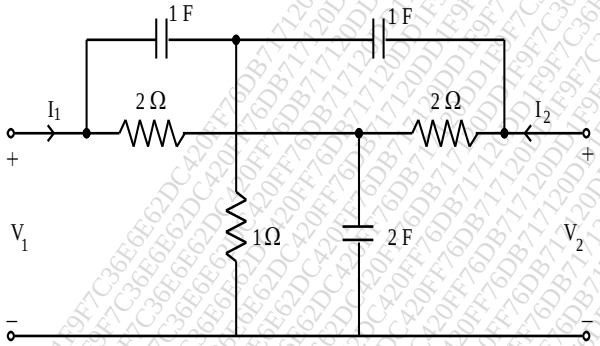
i) $\frac{s^4 + 3s^3 + s^2 + s + 2}{s^3 + s^2 + s + 1}$

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

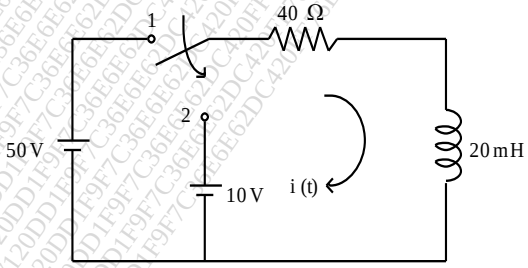


(B) Realize the following functions in Foster II and Cauer I form 10

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

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) The network of Fig. is under steady state with switch at position 1. At t = 0, switch is moved to position 2. Find i (t). 10



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