21/12/16

S.E IV ETRX OLD

Electronic & Elect. Measurg Instru & M/c

Q.P. Code : 547200

(3 Hours) **[Total Marks:100**

N.B. : (1) Question **No. 1** is compulsory.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data whenever necessary.

1. Answer the following - **(any four)** **20**
   (a) State the requirements of good Laboratory type signal generator.
   (b) What is back emf. Explain its significance.
   (c) Draw and explain frequency oscillator.
   (d) What are the factors involved in selection of electronic analog voltmeter.
   (e) Explain the function of delay line in CRO.

2. (a) Explain flash type A-D converter with suitable diagram. **10**
   (b) Explain R-2R ladder technique used in D/A converter. **10**

3. (a) Explain digital phase meter using flip-flop. Also state its advantages and disadvantages. **10**
   (b) Explain different methods of speed control of d.c. motor. **10**

4. (a) Explain the working of moving iron type of power factor meter. **10**
   (b) How Kelvin double bridge is different from Wheatstone bridge. Explain. **10**

5. (a) State the general characteristics of DVM. Explain with block diagram stair case ramp type DVM. **10**
   (b) How will you find the value of capacitance with the help of Schering bridge. Draw Vector diagram. **10**

6. (a) Explain the principle of operation of PMMC and moving iron type instrument compare them. **10**
   (b) Explain BFO with its advantages and disadvantages. **10**

7. Write short notes on- **20**
   (a) DSO
   (b) Stepper motor
   (c) FET voltmeter
   (d) ADC

Sem-IV ETRX (OLD) 8/12/16

Electronic Circuit Analysis and Design.

Q.P. Code : 547002

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**
(2) Solve any **four** questions from question No **2 to 7**.
(3) Assume suitable data wherever necessary.

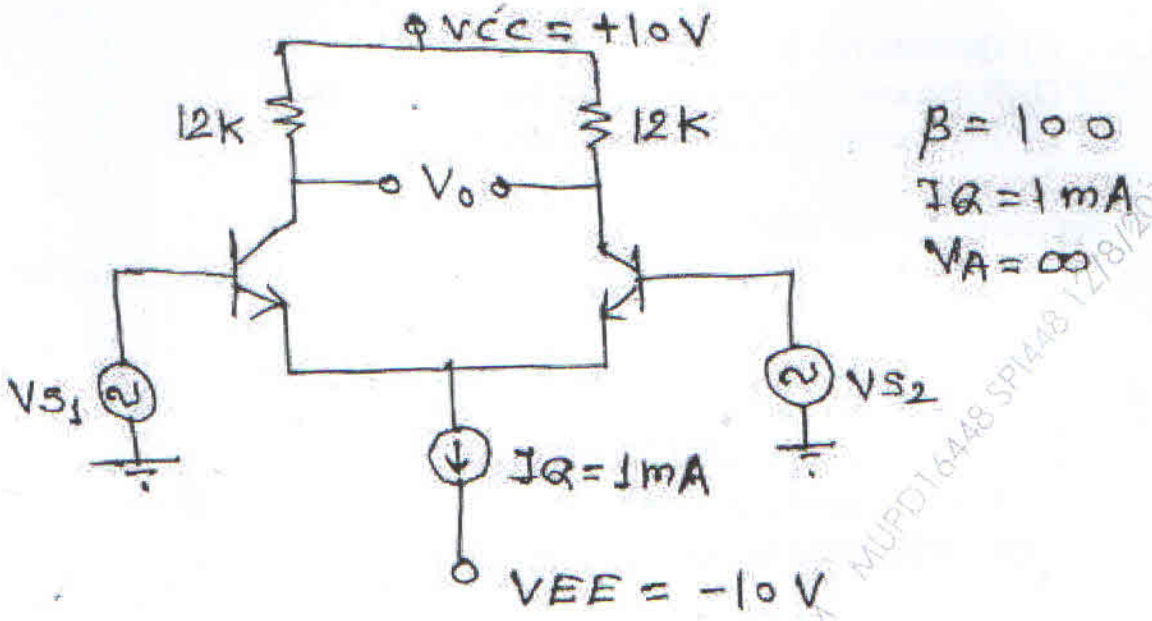
1. Solve any **four** questions from the following **20**
   (a) How internal capacitances affect high frequency response of BJT amplifier
   (b) What is Bark-Hausen criteria in oscillator circuit
   (c) Compare power Amplifier with voltage Amplifier
   (d) What is differential amplifier with active load.
   (e) Compare multistage amplifier with single stage amplifier.
   (f) What is the need of -ve feedback in amplifiers.

2. Design a Two stage CS amplifier to get Av > 100, fL = 15Hz **20**
   Vo = 3V use suitable biasing circuit and suitable JFET transistor from data sheet.

3. (a) Explain class B power amplifier in detail. **10**
   (b) Draw neat diagram of RC phase shift oscillator, explain its working. **10**

4. (a) Explain High frequency response of BJT Amplifier. **10**
   (b) Design an RC Phase shift oscillator using JFET, to produce an output frequency of 2 KHz, **10**
   Given : VDD = 10V, gm = 4 mS,
   Vp = - 4V, IDSS = 10 mA

5. (a) Design class A power transformer coupled power amplifier for **10**
   Po = 20 W and RL = 10 Ω
   (b) For the given differential amplifier calculate Ad, ACM and CMRR. **10**



6. (a) Derive equations of Af, Rif and Rof for voltage-series -Ve feedback amplifier. **10**

   (b) Derive equation of Ad, Ri and Ro for dual input, Balanced output Differential amplifier. **10**

7. Write short notes on any **four**:- **20**

   (a) Frequency Response of Amplifier
   (b) Constant current source
   (c) CASCODE Amplifier
   (d) Nyquist stability criteria
   (e) Heat sink

Sem-IV ETRX (OLD) 8/12/16
Electronics Circuit Analysis & Design

Q.P. Code : 547002

Transistor type	$P_{d\,max}$ @ 25°C Watts	$I_{c\,max}$ @ 25°C Amps.	$V_{CE(sat)}$ volts d.c.	V_{CBO} volts d.c.	V_{CEO} (Sus) volts d.c.	V_{CER} (Sus) volts d.c.	V_{CEX} volts d.c.	V_{BEO} volts d.c.	T_j max. °C	D.C. min	current typ.	gain max.	Small min.	Signal typ.	h_{fe} max.	V_{BE} max.	θ_{jc} °C/W	Derate above 25°C W/°C
2N 3055	115.5	15.0	1.1	100	60	70	90	7	200	20	50	70	15	50	120	1.8	1.5	0.7
ECN 055	50.0	5.0	1.0	60	50	55	60	5	200	25	50	100	25	75	125	1.5	3.5	0.4
ECN 149	30.0	4.0	1.0	50	40	—	—	8	150	30	50	110	33	60	115	1.2	4.0	0.3
ECN 100	5.0	0.7	0.6	70	60	65	—	6	200	50	90	280	50	90	280	0.9	35	0.05
BC 147A	0.25	0.1	0.25	50	45	50	—	6	125	115	180	220	125	220	260	0.9	—	—
2N 525 (PNP)	0.225	0.5	0.25	85	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC 147 B	0.25	0.1	0.25	50	45	50	—	6	125	200	290	450	240	330	500	0.9	—	—

Transistor type	h_{ie}	h_{oe}	h_{re}	θ_{ja}
BC 147 A	2.7kΩ	18μmho	1.5×10^{-4}	0.4°C/mW
2N 525 (PNP)	1.4kΩ	25μmho	3.2×10^{-4}	—
BC 147B	4.5kΩ	30μmho	2×10^{-4}	0.4°C/mW
ECN 100	50Ω	—	—	—
ECN 149	15Ω	—	—	—
ECN 055	12Ω	—	—	—
2N 3055	6Ω	—	—	—

BFW 11-JFET MUTUAL CHARACTERISTICS

$-V_{GS}$ volts	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0	2.4	2.5	3.0	3.5	4.0
I_{DS} max mA	10	9.0	8.3	7.6	6.8	6.1	5.4	4.2	3.1	2.2	2.0	1.1	0.5	0.0
I_{DS} typ. mA	7.0	6.0	5.4	4.6	4.0	3.3	2.7	1.7	0.8	0.2	0.0	0.0	0.0	0.0
I_{DS} min. mA	4.0	3.0	2.2	1.6	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

N-Channel JFET

Type	$V_{DS\,max}$ Volts	$V_{DG\,max}$ Volts	$V_{GS\,max}$ Volts	$P_{d\,max}$ @ 25°C	$T_{j\,max}$	I_{DSS}	g_{m} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{ja}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ mho	6	50 KΩ	2 mW/°C	0.59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ mho	2.5	50 KΩ	—	0.59°C/mW

S.E. Sem IV (Electronics) old – Advanced Engg. Mathematics
29/11/16

Q.P. Code : 546802

(OLD COURSE)
(3 Hours) **[Total marks : 100**

Note :-
1) Question **No.1** is **compulsory**.
2) Attempt **any four** questions from the remaining **six** questions.
3) **Figures** to the **right** indicate **full marks**.
4) Use of **statistical table** is **permitted**.

Q.1 a) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}\,dz$, where C is the circle $|z| = 3$. **05**

b) If $A = \begin{pmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{pmatrix}$, find the eigen values of $A^3 + 5A + 8I$. **05**

c) Let $A = \{1, 2, 3, 4\}$ and let R be the relation 'greater than'. Represent R as a set, a digraph, a matrix, and diagram. **05**

d) Let X, Y be two independent binomial variates with parameters $(n_1 = 6,\ p = 1/2)$ and $(n_2 = 4,\ p = 1/2)$ respectively. Evaluate $P(X + Y) = 3$. **05**

Q.2 a) Determine the nature of poles of the function $f(z) = \frac{1-e^{2z}}{z^3}$ and find the residue at each pole. **06**

b) An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policy holders were randomly selected from the population, what is the probability that no more than two of its clients are involved in such accident next year? **06**

c) If $A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 0 \\ 1/2 & 2 \end{pmatrix}$, prove that both A and B are not diagonalizable but AB is diagonalizable. **08**

TURN OVER

Q. 3 a) If $A = \begin{pmatrix} \pi & \pi/4 \\ 0 & \pi/2 \end{pmatrix}$, find $\cos A$. **06**

b) Let $L = \{1, 2, 3, 6\}$ and R be the relation 'is divisible by'. Prove that L is a lattice. **06**

c) If X denotes the outcome when a fair die is tossed, find moment generating function of X and hence, find the mean and variance of X. **08**

Q. 4 a) Prove that the set of real numbers is a group under $*$ defined by $a * b = a + b - 2$. **06**

b) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls. **06**

c) Evaluate $\int_0^{2\pi} \frac{d\theta}{5+3\sin\theta}$. **08**

Q. 5 a) Test whether the following function is one-to-one, onto, or both $f: Z \to Z,\ f(x) = x^2 + x + 1$ where Z is the set of integers. **06**

b) In a distribution exactly normal 7% of items are under 35 and 89% are under 63. What are the mean and standard deviation? **06**

c) A continuous random variable X has the following probability law: **08**

$$f(x) = k\,x^2, \quad 0 \le x \le 2$$

Determine k and find the probabilities that

$(i)\ 0.2 \le X \le 0.5, \quad (ii)\ X \ge \frac{3}{4}$ given that $X \ge 1/2$.

Q. 6 a) Apply Cayley-Hamilton theorem to $A = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix}$ and deduce that $A^8 = 625\, I$. **06**

b) Fit a Poisson distribution to the following data: **06**

No. of deaths	0	1	2	3	4
Frequencies	123	59	14	3	1

c) The following table gives the number of accidents in a city during a week. Find whether the accidents are uniformly distributed over a week. **08**

Day	Sun	Mon	Tue	Wed	Thurs	Fri	Sat	Total
No. of accidents	13	15	9	11	12	10	14	84

Level of significance is 5%.

Q. 7 a) Show that the matrix **06**
$\begin{pmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$ is diagonalizable. Find the transforming matrix and the diagonal matrix.

b) Find Laurent's series which represents the function **06**
$f(z) = \frac{2}{(z-1)(z-2)}$ when $(i)\ |z| < 1,\ (ii)\ 1 < |z| < 2.$

c) Prove that $(Z_5, +, \cdot)$ is a field where Z_5 is a set R of residue classes of $\{0, 1, 2, 3, 4\}$ modulo 5. **08**