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R-11 / R-13

Code: 1G331

II B.Tech. I Semester Supplementary Examinations May 2017

Electronic Circuits

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **Five** questions

All Questions carry equal marks (**14 Marks** each)

- 1. a) State millers theorem. Explain its significance in transistor circuit analysis 7M
b) Briefly explain how transistor acts as an amplifier, and draw h-parameter model of transistor. 7M
- 2. a) Explain about boot strapped emitter follower. 6M
b) Explain cascode amplifier and derive voltage gain. 8M
- 3. a) Draw the Hybrid π -model for a transistor in the CE Configuration and the significance of every component in this model? 7M
b) Explain the frequency response of amplifier at Low and Mid frequencies 7M
- 4. a) Explain the concept of feedback with block diagram 7M
b) Briefly discuss about the effect of feedback on amplifier bandwidth 7M
- 5. a) Explain the Working of transistorized wein-bridge oscillator with neat diagram 10M
b) A wein bridge oscillator has a frequency of 400Hz, if the value of C is 100pF then determine the value of R. 4M
- 6. a) A Class B Push-Pull amplifier supplies power to a loud speaker of 10 .The transformer has a turn ratio of N1:N2 of 4:1 and efficiency is 95%.calculate the following.
(i) Max power output
(ii) Max power dissipation in each transistor 8M
b) Derive the expression for efficiency of series fed Class A power amplifier 6M
- 7. a) Draw and explain the circuit diagram of a single tuned coupled amplifier. Also explain its operation 8M
b) Explain Advantages, disadvantages and applications of tuned amplifiers 6M
- 8. a) Derive expression for line regulations and load regulations 7M
b) Explain IC regulators 79XX and 723. 7M

Code: 1G236

II B.Tech. I Semester Supplementary Examinations May 2017

Electrical Circuit Theory

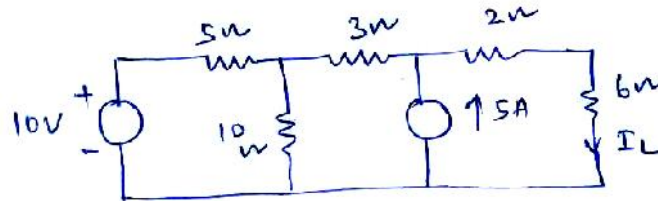
(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

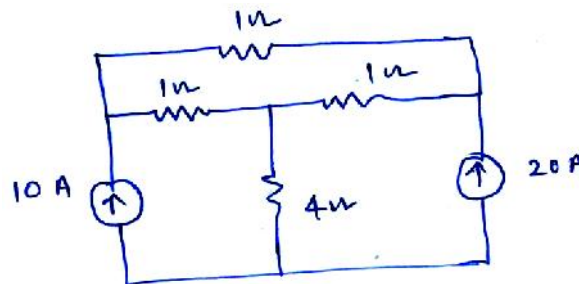
Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

1. a) State the Ohm's law and kirchoff laws 6M
 b) Using source transformation find I_L of the circuit shown in figure



8M

2. a) Define the following term 8M
 i) Node ii) Path iii) Loop iv) Branch
 b) Find the current through the 4 ohm resistor in the circuit of figure by nodal method

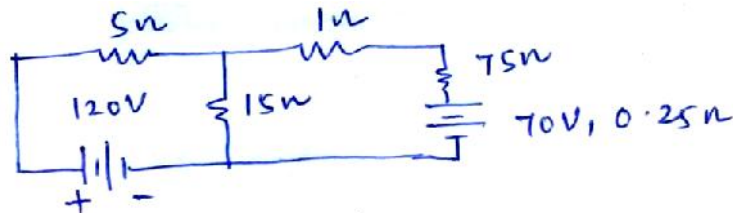


6M

3. a) Define the following terms 8M
 i) Cycle ii) Amplitude iii) Phase iv) Form factor
 b) Find the RMS and average value of a full rectified sinusoidal current waveform. Hence find form factor and amplitude factor 6M

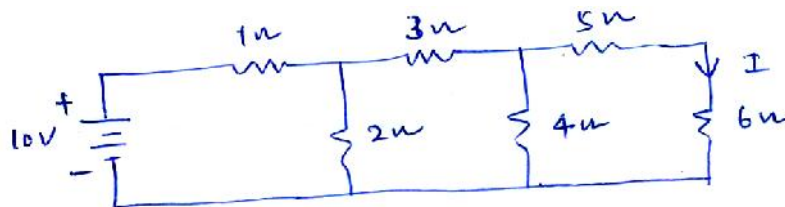
4. a) A series RLC circuit with $R = 100 \text{ ohm}$, $L = 10 \text{ mH}$ and $C = 1 \text{ } \mu\text{F}$ is connected to a 20 V Ac supply. Find the resonant frequency, Quality factor, half power frequencies, Bandwidth and current at resonance 8M
 b) Calculate the magnitude and phase angle of the impedance of a series resonant circuit at 10 KHZ below the resonant frequency of 1.5 MHZ . The quality factor is 80 and the capacitance is 300 PF 6M
5. a) What are the advantages of three phase system over single phase system 4M
 b) Derive the relation between line and phase quantities of a balanced three phase star and delta connected system 10M

6. a) Explain the comparison of electrical and magnetic circuits 6M
 b) An iron ring of cross sectional area 03 cm^2 has an air gap of 1 mm length. A coil of 600 turns wound over the ring carries a current of 2A . The mmf in the air gap is 70% of the total mmf and reluctance. 8M
7. a) State and explain thevenin's theorem 8M
 b) Find the current in 75 ohm resistor in the circuit shown in figure using super position theorem



6M

8. a) State and explain millman's theorem 8M
 b) Find I in the circuit shown in figure by verify reciprocity theorem



6M

Code: 1GC32

II B.Tech. I Semester Supplementary Examinations May 2017

Engineering Mathematics
(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

1. a) Reduce the following matrix into its normal form and hence find its rank.

$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

7M

b) Solve the system of equations $x + 4y - z = -5$; $x + y - 6z = -12$; $3x - y - z = 4$ by using Gauss elimination method.

7M

2. a) Find the real root of the equation $3x = \cos x + 1$ using Newton-Raphson method.

7M

b) Find by Taylor's series method the value of y at $x = 0.1$ and $x = 0.2$ to five places of decimals from $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$.

7M

3. a) Fit a straight line to the following data using method of least squares.

x	1	2	3	4	5
y	14	27	40	55	68

7M

b) Ten participants in a contest are ranked by two judges as follows:

x	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient.

7M

4. a) Form a partial differential equation by eliminating the arbitrary functions from

$$z = f(x + at) + g(x - at)$$

7M

b) Solve the partial differential equation $pxy + pq + qy = yz$ using Charpit's method.

7M

5. a) Obtain the Fourier series for $f(x) = x^2$ in the interval $-f < x < f$.

7M

b) Find the half-range cosine series for the function $f(x) = (x - 1)^2$ in the interval $0 < x < 1$

7M

6. Find the Fourier sine transform of $e^{-|x|}$. Hence show that $\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{f}{2} e^{-m}$, $m > 0$.

14M

7. a) Find the mean, median and mode for the following data:

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	14	17	22	26	23	18

7M

b) The probability density function of a variate X is

X	0	1	2	3	4	5	6
P(X)	k	3k	5k	7k	9k	11k	13k

Find (i) k (ii) $P(X < 4)$ (iii) $P(X \geq 5)$ (iv) $P(3 < X \leq 6)$

7M

8. a) The probability that a pen manufactured by a company will be defective is 0.1. If 12 such pens are manufactured, find the probability that (i) exactly two will be defective, (ii) at least two will be defective and (iii) none will be defective.

6M

b) In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for (i) More than 2150 hours and (ii) more than 1920 hours & but less than 2160 hours. (Given $A(Z = 1.83) = 0.4664$ and $A(Z = 2) = 0.4772$)

8M

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R-11 / R-13

Code: 1GC34

II B.Tech. I Semester Supplementary Examinations May 2017

Environmental Science

(Common to ECE & IT)

Max. Marks: 70

Time: 3 Hours

Answer any **Five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Mention few institutions involved and role played by them in protecting the environment. 7M
b) What are the reasons for the decline of ecosystem globally? 7M

2. a) Enumerate few conflicts over water that you have known. 7M
b) Write a note on alternate energy resources and their usage. 7M

3. a) What is over grazing? Write a note on the impact of over grazing. 7M
b) How soil erosion occurs. Mention few remedial measures to prevent soil erosion. 7M

4. a) Explain the effects caused by water pollution and how it will be controlled. 7M
b) Write short notes on
i. Thermal pollution and
ii. Marine pollution 7M

5. What are the characteristic features of aquatic ecosystem? 14M

6. a) Describe the values of biodiversity. 7M
b) Summarize the threats to biodiversity. 7M

7. a) What is Air pollution Act? Mention the postulates of Air pollution Act? 7M
b) Describe the best practices of solid waste management. 7M

8. a) Enumerate the human rights with respect to environment protection. 7M
b) Write notes on the impact of environment on human health. 7M

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R-11 / R-13

Code: 1G332

II B.Tech. I Semester Supplementary Examinations May 2017

Pulse and Digital Circuits

(Electronics & Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **Five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Draw the Output Response of RC Low Pass circuit for a Step Input signal and derive the expression for Rise Time. 7M
b) Draw the output waveforms of an RC High-Pass Circuit with Square wave input under different time constants. Explain the same. 7M
2. a) Design a diode clamper circuit to restore the positive peaks of 2 KHz input signal to a voltage level equal to 6 V. Assume that the diode voltage during forward bias condition is 0.7 V. 7M
b) Design a Two-level Diode Clipper circuit and explain the same with the help of Waveform and Transfer characteristics. 7M
3. a) Describe the sequence of events that lead to Reverse Recovery Time, Storage Time and Transition Time in a Semiconductor Diode. 7M
b) Discuss the terms pertaining to Transistor Switching characteristics: i. Rise Time; ii. Delay Time; iii. Turn-On Time; iv. Storage Time; v. fall Time; vi. Turn-Off Time 7M
4. a) Explain the working of a Bistable Multivibrator circuit with the help of neat waveforms. 7M
b) Derive the expressions for UTP and LTP of Schmitt Trigger. 7M
5. a) Define the terms Slope Error, Displacement Error and Transmission Error. How are they related for an exponential Sweep Circuit? 7M
b) Discuss the general considerations of Miller and Bootstrap Time Base generations. 7M
6. a) What is Pedestal? How does it affect the output of Sampling Gates? 7M
b) Draw the Sampling Gate with Four Diodes and explain its operation. 7M
7. a) With the help of a Circuit diagram and Waveforms, explain the Frequency division by an Astable Multivibrator. 7M
b) Illustrate the terms Synchronization and Frequency Division of a Sweep Generator. 7M
8. a) Realize a 2-input NAND Gate using TTL Logic and explain the same with help of Functional table. 7M
b) Realize a 2-input NOR gate using CMOS Logic and explain the same with help of Functional table. 7M

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II B.Tech. I Semester Supplementary Examinations May 2017

Random Variables and Random Processes
(Electronics & Communication Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)

1. a) i. State any two properties of cumulative distributive function 2M
 ii. When the two random variables are said to be uncorrelated 2M
 iii. State Baye's theorem 3M
- b) i. Write the properties of conditional distribution 3M
 ii. A random variable X is known to have a distribution function $F_X(x) = u(x)[1 - e^{-x^2/b}]$, where $b > 0$ is a constant. Find its density function. 4M
2. a) i. Define mean and variance of a random variable 3M
 ii. If the probability density function of a continuous random variable X is given by $f(x) = e^{-x}, 0 \leq X \leq \infty$, find the mean and variance of X 4M
- b) i. What is Chebychev's inequality? 2M
 ii. For a random variable X, if a mean value $E(X) = 6$ and variance $\sigma_x^2 = 2$ then determine the second moment of X about the origin $E(X^2)$ 5M
3. a) i. Write the properties of joint density function 3M
 ii. A random variable has a probability density $f_x(X) = \begin{cases} \frac{5}{4}(1-x^2) & 0 < x \leq 1 \\ 0, & elsewhere \end{cases}$
 Find I) $E(X)$ II) $E(4X+2)$ III) $E(X^2)$ 4M
- b) i. State and prove central limit theorem 4M
 ii. The joint probability density function of x and y is given by $f(x, y) = \frac{6-x-y}{8}, 0 \leq x \leq 2, 2 \leq y \leq 4$
 $= 0, otherwise$
 Calculate the mean and variance of x and y. 3M
4. a) What is Linear Time Invariant system, explain it with an example. 7M
 b) Derive the transfer function of LTI system by considering an example. 7M
5. a) Briefly describe the noise bandwidth. Derive the expression for output noise power in terms of noise bandwidth 8M
 b) State the differences between bandpass, band-limited and narrowband processes 6M
6. a) Define wide sense stationary form of a random process and show that the random process $X(t) = A \cos(\check{S}_0 t + \check{\theta})$ is wide sense stationary if it is assumed that A and \check{S}_0 are constants and $\check{\theta}$ is a uniformly distributed random variable on $(0, 2\pi)$. 7M
- b) Two random variables X and Y have means $\bar{X} = 1$ and $\bar{Y} = 2$, variances $\sigma_x^2 = 4$ and $\sigma_y^2 = 1$, and correlation coefficient $\rho_{XY} = 0.4$. The new random variables W and V are defined by $W = X + 3Y, V = -X + 2Y$, find a) means b) variances c) correlations and d) correlation coefficient ρ_{VW} of V and W. 7M
7. a) State the properties of autocorrelation 7M
 b) Find covariance and correlation coefficient of two random variables X and Y if $E(x) = 2, E(y) = 3, E(xy) = 10, E(x^2) = 9$ and $E(y^2) = 16$. 7M
8. a) Describe the properties of power density spectrum 7M
 b) Derive the relationship between power spectrum and autocorrelation function. 7M
