Code : 1G331

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Electronic Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Briefly explain how transistor acts as an amplifier, and draw h-parameter model of transistor. 7M

   b) Explain Miller's theorem and its dual. 7M

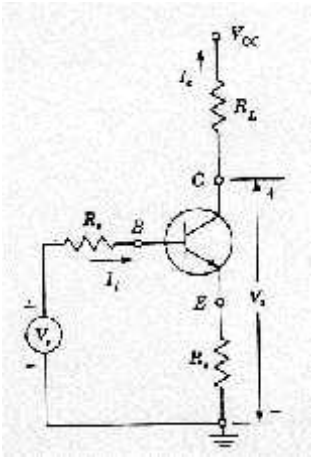
2. a) Explain about Boot-strapped emitter follower. 7M

   b) Explain about the coupling methods of transistor amplifiers. 7M

3. a) Explain CE short circuit current gain and gain-bandwidth product. 6M

   b) Explain about hybrid- π conductances. 8M

4. a) The circuit of figure shown is to have an overall trans conductance gain of -1mA/V, a voltage gain of -4, and a desensitivity of 50. If R_s=1K, h_{fe}=150,and $r_{bb'}$ is negligible, find (a) R_e, (b) R_L, (c) R_{if}, and (d) the quiescent collector current I_C at room temperature.



9M

   b) Derive expressions for voltage series feedback amplifier. 5M

5. a) Explain Barkhausen criteria for both positive and negative feedback amplifiers. 8M

   b) Explain the oscillation mechanism of wein bridge oscillator. 6M

6. a) Derive expressions for second harmonic and higher order harmonic distortion. 6M

   b) Explain class B and class AB large signal amplifiers. 8M

7. Explain the effect of Cascading on Single tuned and double tuned amplifiers Band width. 14M

8. a) Derive expressions for line regulation and load regulation. 7M

   b) Explain IC regulators 79XX and 723. 7M

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Code : 1G236

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Electrical Circuit Theory

(Electronics and Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Explain source transformation with examples 6M

   b) Find the voltage to be applied across AB in order to drive a current of 5A into the circuit by using star-delta transformation. Refer figure 1.

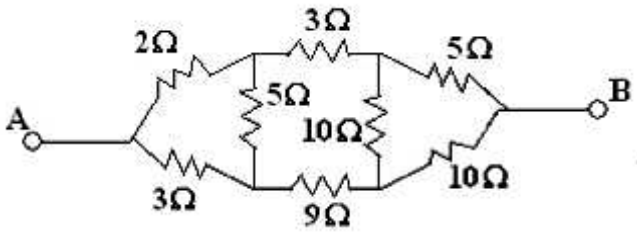

Figure 1 8M

2. a) For the circuit shown in figure 2(a) find the current through 2v source using mesh analysis

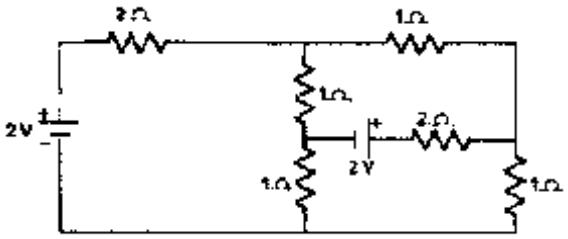

Figure 2(a) 7M

   b) For the circuit shown in figure 2(b). Use nodal analysis to determine voltage across 3 Ω and 12 Ω resistance. Compute power absorbed by 6 Ω resistor.

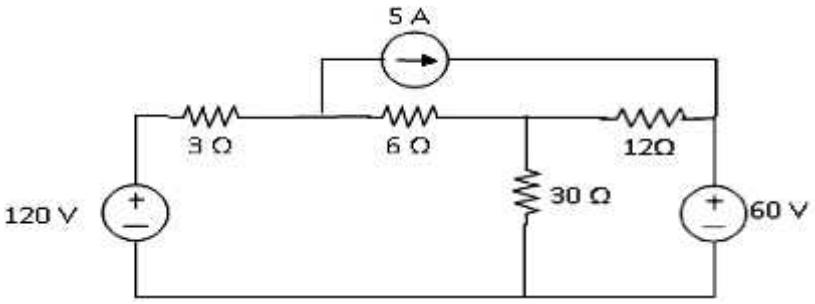

Figure 2(b) 7M

3. a) Find RMS and average values of the voltage waveform shown in below Figure 3

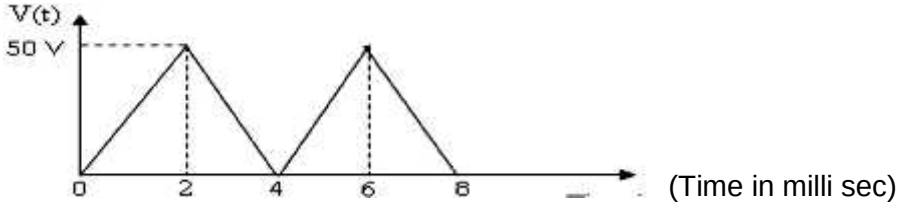

Figure 3 8M

   b) Determine the form factor and peak factor of a sinusoidal wave form 6M

4. a) Explain the sinusoidal response of series RC circuit and derive necessary expressions. 6M

   b) Derive the expression for resonant frequency in terms of half power frequencies of RLC series 8M

5. a) Derive the relationship between the line and phase quantities in a 3-phase balanced
   i) Star connected System and
   ii) Delta connected System 6M

   b) A 3-phase load has a resistance of 10 Ω in each phase and is connected in
   i. Star and ii. Delta against a 400V, 3-phase supply. Compare the power consumed in both the cases. 8M

6. a) Define the following
   i) MMF ii) Reluctance, iii) Flux density and iv) Permanence 6M

   b) The combined inductance of two coils connected in series is 0.6H or 0.1H, depending upon the relative directions of the currents in the coils. If one of the coils when isolated has a self-inductance of 0.2H, Calculate
   i. Mutual inductance, and
   ii. The Coefficient of coupling. 8M

7. a) State and explain the Norton's Theorem 6M

   b) Determine the current in 1K Ω resistor network shown in figure 7 by using superposition theorem.

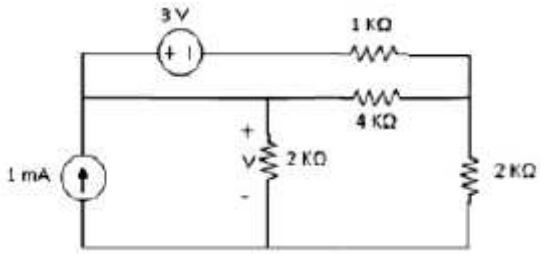

Figure 7 8M

8. a) State and Explain Compensation Theorem 6M

   b) Verify reciprocity theorem for the voltage V and Current I in the network shown in figure 8.

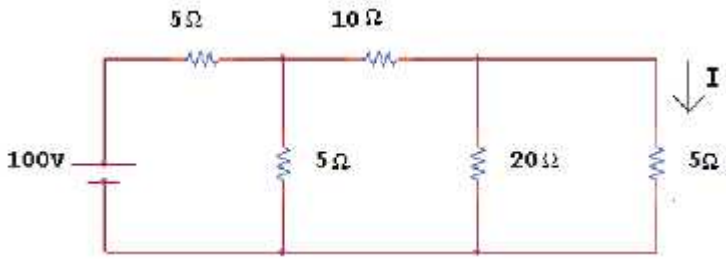

Figure 8 8M

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Code : 1GC32

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Engineering Mathematics

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) For what values of k, the equations x + y + z = 1, 4x + y + 10z = k^2, 2x + y + 4z = k are consistent and solve them completely. 7M

   b) Find the Eigen values and Eigen vectors of A^{-1} where $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. 7M

2. a) Find the real root of the equation x + tan x – 1 = 0 by using Regula-False method correct to three decimal places. 7M

   b) Find y(1.2) by Fourth order Runge Kutta method, given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ with y(1) = 1. 7M

3. a) Fit an exponential curve of the form $y(x) = ae^{-bx}$ to the following data.

x	1	2	3	4	5
y	2.6	3.3	4.2	5.4	6.9

   7M

   b) A computer operator while calculating the coefficient between two variates *x* and *y* for 25 pairs of observations obtained the following constants :

   $n = 25, \sum x = 125, \sum x^2 = 650, \sum y = 100, \sum y^2 = 460, \sum xy = 508$

   It was however later discovered at the time of checking that he had copied down two pairs as (6, 14) and (8, 6) while the correct pairs were (8, 12) and (6, 8).Obtain the correct value of the correlation coefficient. 7M

4. a) Form the partial differential equation by eliminating the arbitrary functions from $z = f_1(y + 2x) + f_2(y - 3x)$. 7M

   b) Using the method of separation of variables, solve $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ if $u(x, 0) = 4x - \frac{1}{2}x^2$ 7M

5. a) Obtain the Fourier series to represent the function $f(x) = \frac{1}{4}(\pi - x)^2$; $0 < x < 2\pi$ 7M

   b) Develop $f(x) = \sin\left(\frac{\pi x}{L}\right)$ in a half-range cosine series in $0 < x < L$ 7M

6. a) Find the Fourier transform of $f(x) = \begin{cases} 1 & for\ |x| < 1 \\ 0 & for\ |x| > 1 \end{cases}$ hence evaluate $\int_0^\infty \frac{\sin x}{x}\,dx$ 7M

   b) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, $(a > 0)$ 7M

7. a) If X and Y are two discrete random variables, then prove that $E(X + Y) = E(X) + E(Y)$, provided $E(X)$ and $E(Y)$ exist. 7M

   b) For the following probability distribution

x	-3	6	9
p(x)	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

   Find i) E(X) ii) $E(X^2)$ iii) $E[(2X + 1)^2]$ 7M

8. a) The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(X \geq 2)$. 7M

   b) Find the mean and standard deviation of a normal distribution in which 31% of items are under 45 and 8% are over 64. 7M

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Code : 1GC34

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Environmental Science

(Common to ECE & IT)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1.	a)	What is the importance environmental studies? Explain	7M
	b)	Discuss the various values of nature.	7M
2.	a)	Write note on renewable and non-renewable energy sources	7M
	b)	Explain the advantages and disadvantages of dam building construction.	7M
3.	a)	What are the adverse effects of pesticides on modern agriculture?	7M
	b)	Enumerate the properties of soil explain its degradation.	7M
4.	a)	What are the various causes for water pollution? Explain.	8M
	b)	Write a note on any two pollution case studies.	6M
5.	a)	Define ecosystem. Explain different components of an ecosystem.	8M
	b)	Discuss the structure and functions of forest ecosystem.	6M
6.	a)	What is mean by biodiversity? Explain genetic and species diversity.	8M
	b)	What are the major threats to biodiversity? Discuss.	6M
7.	a)	What is meant by “sustainable development”? Explain.	7M
	b)	What is meant by acid rain? Explain with examples.	7M
8.	a)	What is mean by epidemic diseases? Explain.	8M
	b)	Write note on HIV/AIDS control programme in India.	6M

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Code : 1G332

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Pulse & Digital Circuits

(Electronics & Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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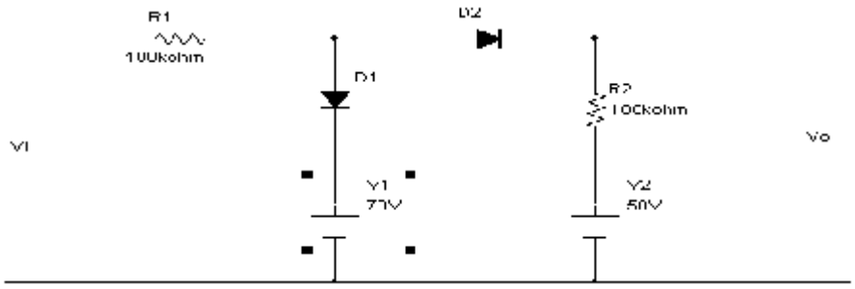
1. a) Explain about step input response of RC high pass network 7M

   b) The peak-to-peak amplitude of a square wave is 10V and extends from -5V to +5V. The duration of the positive interval is 0.3 sec. and that of the negative interval is 0.6 sec. This square waveform is applied to a RC integrator circuit with time constant 0.6 sec. Determine the steady-state response of the circuit and identify the max and min values of the output waveform. 7M

2. a) State and explain clamping circuit theorem 4M

   b) The input voltage of the two level clipper is varying linearly from 0 to 80V, draw the output waveform and transfer characteristics.



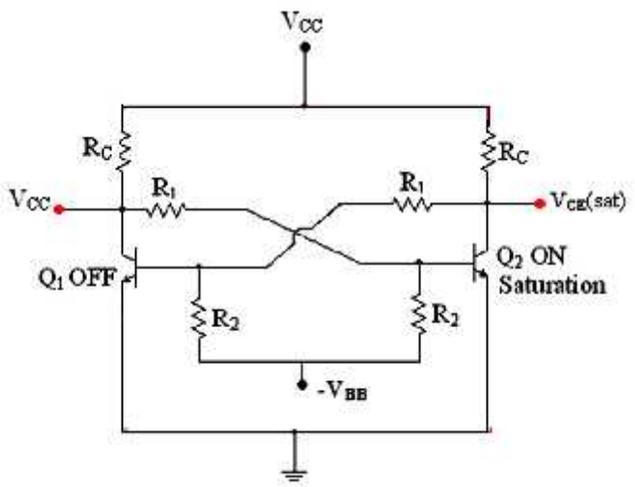
10M

3. a) Explain the diode switching times. 7M

   b) Explain the transistor switching times with neat circuit diagram and waveforms. 7M

4. a) Explain the operation of collector coupled monostable multivibrator with circuit diagram and waveforms. 7M

   b) The bistable multi shown in fig. have h_{FE} =80, Vcc=5V, V_{BB}=5V, Rc=1.2 KΩ, R_1=6.8KΩ, and R_2=47 KΩ. Determine all stable state currents and voltages in the multivibrator.



7M

5. a) What are the methods of generating a time-base waveforms 6M

   b) Explain about the transistor Bootstrap time-base generation. 8M

6. a) Explain about bi-directional sampling gates 7M

   b) Explain some applications of sampling gates. 7M

7. a) Explain about synchronization of relaxation device with external pulses. 7M

   b) Explain about frequency division in the sweep circuit. 7M

8. a) Explain about diode-logic OR & AND gates. 7M

   b) Explain about DTL NOR gate 7M

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Code : 1G333

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Random Variables and Random Processes

(Electronics & Communication Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Define the following terms
   i) Sample space ii) Disjoint events iii) Probability iv) independent events 8M
   b) A box contains 4 red and 5 white balls. An experiment is to draw two balls from the box without replacement. What is the probability that the first ball is white and second ball is white? 6M
2. a) Define a random variable. Write conditions for a function to be a random variable. 8M
   b) A random variable X has the density function $f_X(x) = \frac{1}{5}u(x)e^{-x/5}$. Find the probability of events i) $A = \{1 < X \leq 3\}$ ii) $B = \{X \leq 2.5\}$ iii) $C = \{X > 2.5\}$ 6M
3. a) Define the joint distribution function and list out its properties. 7M
   b) Explain the Central Limit Theorem. 7M
4. a) Show that the auto-correlation function of LTI system response is $R_{YY}(\tau) = R_{XX}(\tau) * h(\tau) * h(-\tau)$ 7M
   b) Prove that the output Power Spectral Density equals the input Power Spectral Density multiplied by the squared magnitude of the transfer function of the linear filter. 7M
5. a) Define Band Limited process and list out the properties of Band Limited processes. 7M
   b) Explain the Effective noise temperature with the help of example. 7M
6. a) Explain the concept of random process. 7M
   b) Explain the first order stationary and second order stationary. 7M
7. a) Define Auto-correlation function? State and prove its properties. 7M
   b) Given the ACF, for a stationary ergodic process with no periodic components, is $R_{XX}(\tau) = 25 + \frac{4}{1+6\tau^2}$. Find the mean value and variance of the process $X(t)$. 7M
8. a) If $R_{XY}(\tau) = Ae^{-\alpha|\tau|}\cos(\omega_0\tau)$, Find $S_{XY}(\omega)$. 6M
   b) Explain the relationship between the Auto-correlation function and the Power spectral density. 8M

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