Hall Ticket Number :										

R-11 / R-13

Code: 1G236

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Electrical Circuit Theory

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

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

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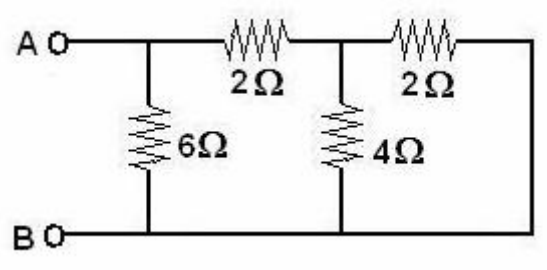
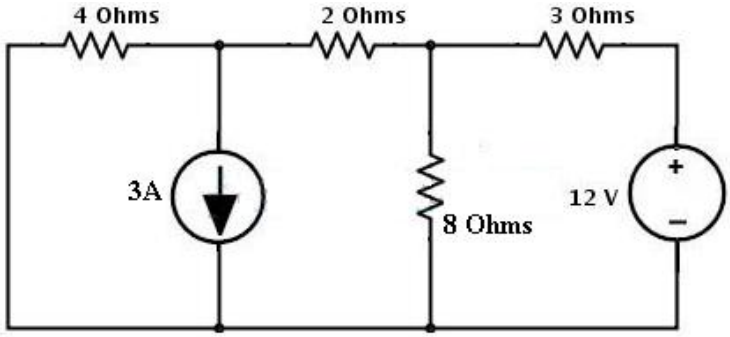
1. a) Determine the equivalent resistance between A and B of the network shown below.



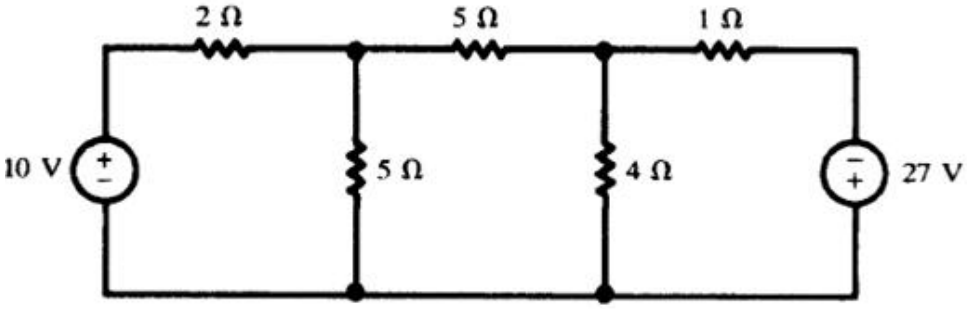
4M

b) Use source transformation to simplify the network to a single voltage source and single resistance.



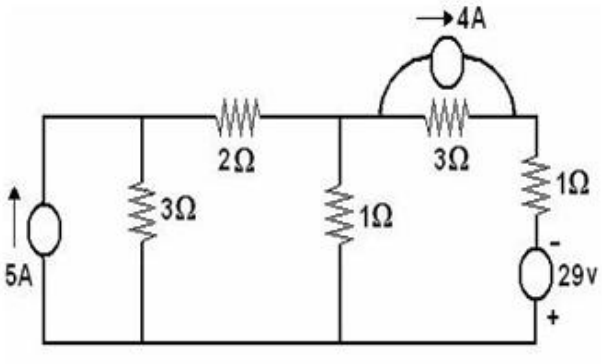
10M

2. a) Using mesh analysis find current through 4Ω resistor.



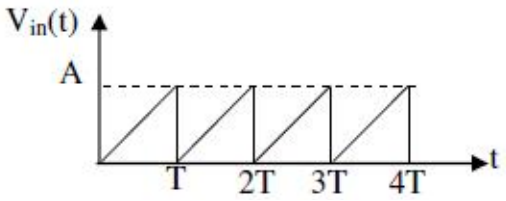
7M

b) Determine the current in the 2Ω resistor for the circuit shown below, by using nodal analysis.



7M

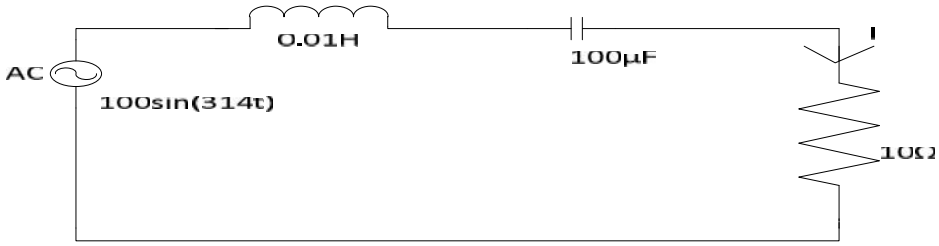
3. a) Find peak factor and form factor of following waveform.



8M

b) What are the advantages of Sinusoidal waveform as AC voltage waveform? 6M

4. a) Find current I for the circuit shown below.



6M

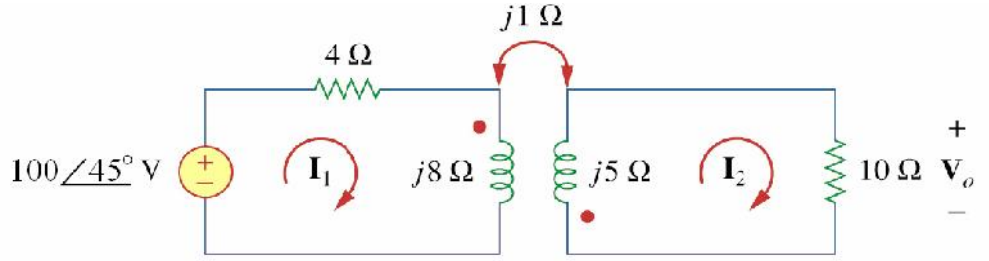
b) Design a series RLC circuit that will have an impedance of 10Ω at the resonant frequency of w_0 = 50rad/sec and a quality factor of 80. Find the B.W and half power frequencies. 8M

5. a) What are advantages of three phase system over single phase system? 4M

b) A 3-phase 4-wire 400V system supplies a balanced Y load having impedances of $20\angle 60^0\ \Omega$ in each phase. Find the line currents and draw phasor diagram. What is the current flow through neutral wire. 10M

6. a) What is significance of DOT convention in coupled circuit? Explain 4M

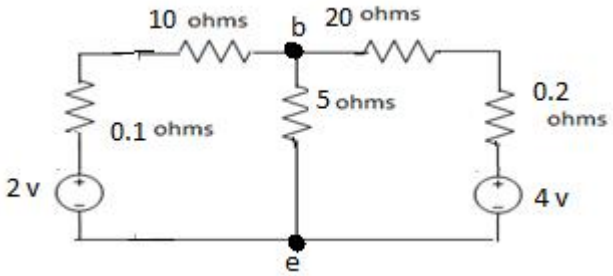
b) Determine the voltage V_o in the circuit shown below.



10M

7. a) State and prove Maximum power transfer theorem. 6M

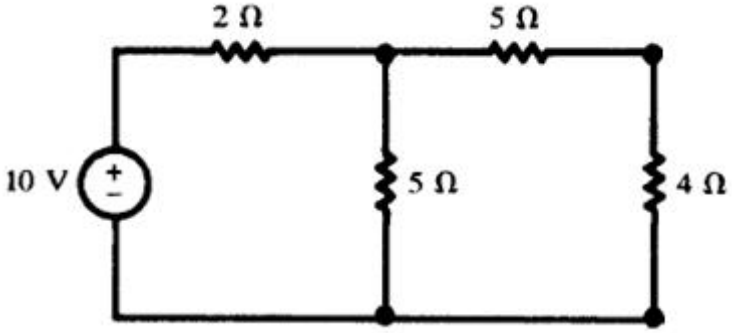
b) Find the current through 'b-e' using Norton's theorem in the circuit shown below.



8M

8. a) State and explain Milliman's theorem. 6M

b) Verify Reciprocity theorem by finding current through 4 Ω resistor.



8M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G331

II B.Tech. I Semester Supplementary Examinations Nov/Dec 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**)

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1. a) Using the h-parameter model, derive the expressions for current gain A_I, input resistance R_i, voltage gain A_V and output resistance R_o of a CE amplifier. 7M

   b) A transistor in CB configuration is driven by a voltage source V_S of internal resistance R_s = 800 Ω. The load impedance is resistor R_L = 2000 Ω. The h-parameters are H_{ib} = 22 Ω, h_{rb} = 3 x 10^{-4}, h_{fb} = -0.98 and h_{ob} = 0.5 μA/V. Compute the current gain A_I, input impedance R_i, voltage gain A_V, overall voltage gain A_{VS}, overall current gain A_{IS} and output impedance Z_o. 7M

2. a) Draw the circuit of a two-stage RC coupled amplifier, draw its small signal equivalent circuit for one stage, draw its simplified equivalent circuit and derive the expression for mid band current gain A_{IM} and voltage gain A_{VM}. 7M

   b) Explain cascode amplifier operation with neat diagrams and mention its uses. 7M

3. a) Derive the expression for short circuit current gain A_{IS} of a CE amplifier. Define f_β and f_T. 7M

   b) The following low frequency parameters are known for a given transistor at room temperature (300^0 K) at I_C = 10 mA and V_{CE} = 8 volts: h_{ie} = 500 Ω, h_{oe} = 2 x 10^{-4} μS, h_{fe} = 100 and h_{re} = 10^{-4} . At the same operating point, f_T = 50 MHz and C_{ob} (C_c) = 3 pF. Calculate the values of hybrid-Π parameters. 7M

4. a) Explain voltage series feedback employed in emitter follower with neat diagrams and obtain the expressions for voltage gain, current gain, input and output impedances. 7M

   b) When the negative feedback is applied to an amplifier of gain 100, the overall gain falls to 50. Calculate (i) the feedback factor β (ii) if the same feedback factor maintained, the value of the amplifier gains required if the overall gain is to be 75. 7M

5. a) Explain the Hartley oscillator circuit and derive the condition for oscillation and then frequency of oscillation. 8M

   b) A Wein bridge oscillator is used to operate at f_o = 10 KHz. If the value of R is 100 KΩ, find the value of the capacitor C. 6M

6. a) Explain class A power amplifier working with neat sketches and derive the expression for conversion efficiency. 7M

   b) Explain class B push-pull amplifier operation with neat diagrams and derive the expression for collector circuit efficiency. 7M

7. a) Explain the operation and frequency response of double tuned amplifier. 7M

   b) What is stagger tuned amplifier? Explain its working. 7M

8. a) Draw shunt voltage regulator and explain its working. 7M

   b) Explain 7805 IC voltage regulator with neat diagrams. 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GC32

II B.Tech. I Semester Supplementary Examinations Nov/Dec 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**)

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1. a) Find the Rank of the matrix by normal form

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$$ 7M

b) Investigate the values of a and b so that the equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + az = b$ have i) no solution ii) a unique solution iii) an infinite number of solutions 7M

2. a) Find a real root of the equation $x\log_{10} x = 1.2$ by Regular - falsi method correct to four decimal places 7M

b) Using Taylor's series method, compute the value of y at x=0.2 from $\frac{dy}{dx} = x + y$; y(0)=1 7M

3. a) Fit a straight line y = a + bx to the data by the method of least squares

x	0	1	3	6	8
y	1	3	2	5	4

7M

b) Fit a least square geometric curve $y = ax^b$ to the data

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

7M

4. a) Form the partial differential equation by eliminating the arbitrary functions f and g from $z = f(x + ay) + g(x - ay)$ 7M

b) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where u(x,0) = 6 e^{-3x} 7M

5. a) Find a Fourier series to $f(x) = x - x^2$ in $(-\pi, \pi)$ 7M

b) Expand the function as the Fourier series of sine terms

$$f(x) = \frac{1}{4} - x; \text{ if } 0 \le x \le \frac{1}{2}$$

$$= x - \frac{3}{4}; \text{ if } \frac{1}{2} \le x \le 1$$ 7M

6. Find the Fourier transform of f(x) $= 1 - x^2$, $1x1 \leq 1$

$= 0$, $1x1 > 1$

Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3}\cos\frac{x}{2}dx$ 14M

7. a) Calculate mean, median and mode of the following data relating to weight of 120 articles

Weight(in gm)	0-10	10-20	20-30	30-40	40-50	50-60
No. of articles	14	17	22	26	23	18

7M

b) The probability density function of a variable X is

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

Find $P(X < 4), P(X \geq 5), P(3 < X \leq 6)$ 7M

8. a) The probability that a pen manufactured by a company will be defective is $\frac{1}{10}$. If 12 such pens are manufactured, find the probability that

i. exactly 2 will be defective
ii. atleast 2 will be defective
iii. none will be defective 7M

b) For a normally distributed variate with mean 1 and standard deviation 3, Find the probability that (i) $3.43 \leq x \leq 6.19$ (ii) $-1.43 \leq x \leq 6.19$ 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G333

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2017

Random Variables and Random Processes

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

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

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1. a) State and Prove Total Probability Theorem 7M

   b) Explain about the distribution and density functions of exponential RV with neat sketches. 7M

2. a) State and prove the properties of variance of a random variable. 7M

   b) Find the characteristic function $Ø_X(\omega)$ for an exponential random variable X. 7M

3. a) State and Prove Central Theorem 7M

   b) Define joint probability density function. list out its properties. 7M

4. a) State and prove the properties of power spectral density. 7M

   b) Explain Spectral Characteristics of System Response 7M

5. a) Discuss about Noise Bandwidth 7M

   b) Explain in detail about Band-Limited and Narrowband Processes. 7M

6. Explain clearly about Stationarity and independence concept with examples. 14M

7. a) Derive an expression that relates autocorrelation function and auto covariance function. 7M

   b) A random process is defined as X (t) = A coswt, where w is constant and A is a uniform random variable over (0, 1). Find the autocorrelation and covariance of X (t). 7M

8. a) List all the properties of auto-correlation function. 7M

   b) Prove relationship between Cross-Power Spectrum and Cross-Correlation Function 7M

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