Code: 9ABS302

R9

B.Tech II Year I Semester (R09) Supplementary Examinations, May 2013

MATHEMATICS - III

(Common to EEE, EIE, E.Con.E, ECE and ECC)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Prove that $\Gamma(n)\,\Gamma(1-n) = \frac{\pi}{\sin n\pi}$.

(b) State and prove Rodrigne's formula.

2 (a) If $f(z)$ is a regular function of z, prove that $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}|f(z)|^2 = 4\,|f^1(z)|^2$

(b) Define an analytic function. Find the analytic function $f(z) = u + iv$ given $u = a(1 + cos\theta)$.

3 (a) Find all values of z which satisfy sin $z = 2$.

(b) Find all principal values of $(1 + \mathrm{i}\sqrt{3})^{(1+\mathrm{i}\sqrt{3}}$.

4 (a) Evaluate $\int_{0,0}^{1,3} 3x^2y \;\; dx + (x^3 - 3y^2)\, dy$ along the curve (i) $y = 3x$. (ii) $y = 3x^2$.

(b) Evaluate $\int_c \frac{dz}{z^8(z+4)}$ where C is the circle $|z| = 2$.

5 (a) Obtain the Taylar series expansion of: $f(z) = \frac{e^z}{z(z+1)}$ about $z = 2$.

(b) Define singular point, expand $f(z) = \frac{e^{2z}}{(z-1)^3}$ as Laurent's series about the singular point $z = 1$.

6 (a) Evaluate $\int_c \frac{4-3z}{z(z-1)(z-2)}\,dz$ where C is the circle |z| = $\frac{3}{2}$ using residue theorem.

(b) Evaluate by contour integration $\int_0^\infty \frac{dx}{1+x^2}$

7 (a) Use Rouche's theorem to show that the equation $z^5 + 15z + 1 = 0$ has one root in the disk |z| $< \frac{3}{2}$ and four roots in the annulus $\frac{3}{2} <$|z|< 2.

(b) State and prove fundamental theorem of algebra.

8 (a) Show that the function W = $\frac{4}{2}$ transform the straight line $x = c$ in the z −plane in to a circle in the w −plane.

(b) Find the bilinear transformation that maps the points 1, $i, -1$ in to the points $2, i, -2$.

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Code: 9ABS303

R09

B.Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ENVIRONMENTAL SCIENCE

(Common to EEE, EIE, E.Con.E, ECE, ECC and CSS)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 Name and describe the major layers of the atmosphere. What are the important effects in each layer?

2 Fresh water is the biggest crisis facing the world today. Comment.

3 (a) What is ecological succession? Give an account of general process of succession in nature.
(b) Describe the characteristic features, structure and function of forest ecosystem.

4 Write an explanatory note on value of biodiversity.

5 Define soil pollution. List some soil pollutants their causes, effects and control measures.

6 “From unsustainable to sustainable development, the need of the hour”. Comment.

7 What is AIDS? Describe the sources and mode of transmission of HIV infection.

8 Give an account of visits to a local area to document environmental assets.

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Code: 9A02305

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ELECTRICAL CIRCUITS

(Common to EEE, EIE, E.Con.E, ECE and ECC)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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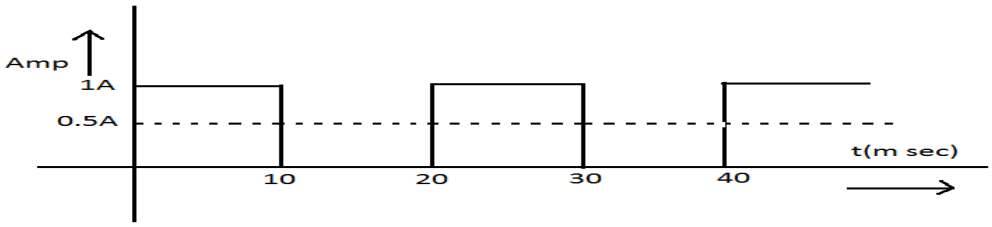
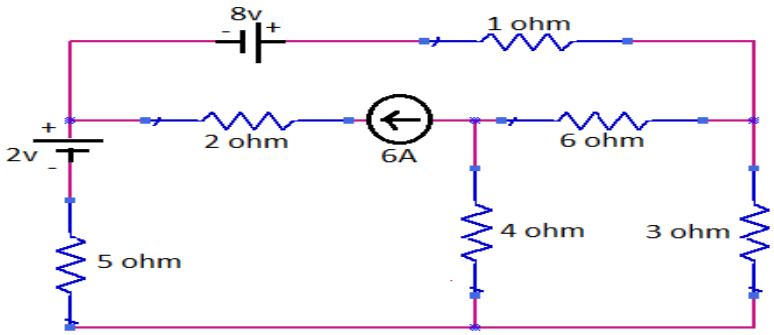
1 (a) Write a note on capacitor and V-I relationship associated with it.

(b) A non alternating periodic waveform has been shown in figure. Find its form factor.



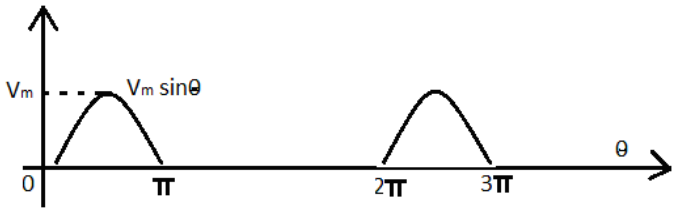
2 (a) A resistance R is connected in series with a parallel circuit comprising two resistances of 12 and 8 ohms. The total power dissipated in the circuit is 700 Watts when the applied voltage is 200 V. Calculate the value of R.

(b) Using nodal analysis, determine the power supplied by 8 V voltage source.



3 (a) Explain significance of average value.

(b) Find RMS and average value of the following wave form.



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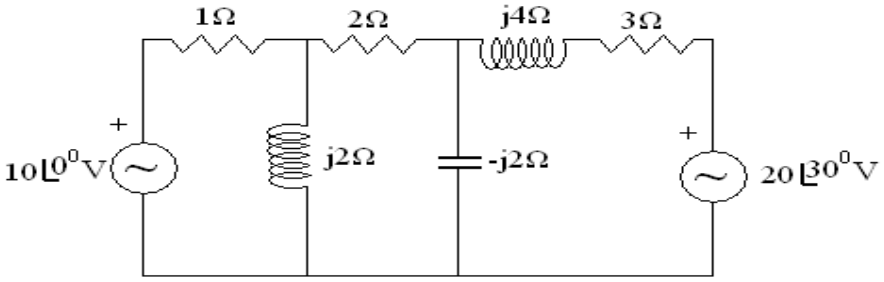
R09

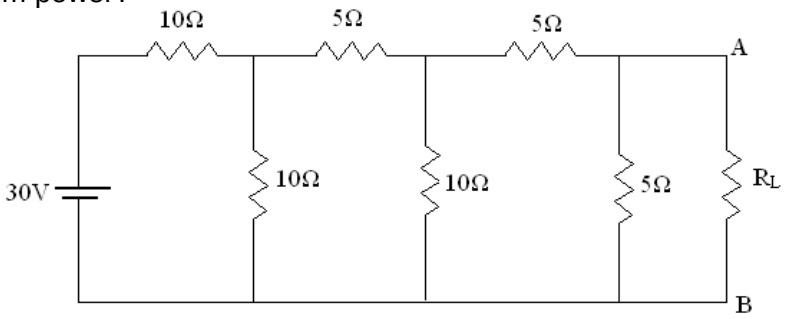
4 (a) Give the expression for frequency and current at resonance in parallel resonance circuit.
(b) A RLC series circuit consists of R = 50 ohms L = 0.16 H and C = 4 micro farads. Calculate resonant frequency, quality factor, band width and half power frequencies.

5 (a) Explain dynamically induced emf and statically induced emf.
(b) Find the AT required to produce of 0.6 mwb in the air gap of a magnetic circuit which has an air gap of 0.4 mm. The iron ring has 5 cm^2 cross section and 50 cm mean length, take μ_r = 2000 and leakage coefficient is 1.2 and exciting current is 2.5 A, find out number of turns.

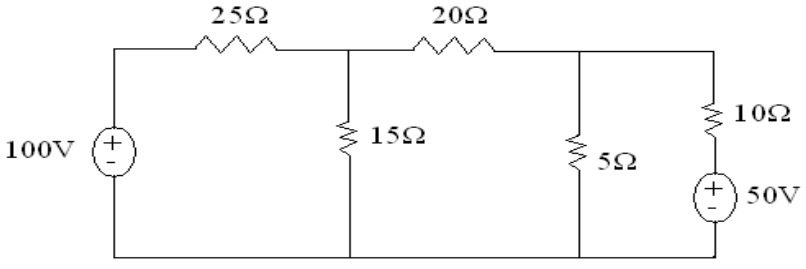
6 (a) Write the properties of tie-set matrix and cut-set matrix.
(b) Using mesh analysis, calculate current through all the elements using mesh analysis.



7 (a) Write limitations of Norton's theorem.
(b) In the network shown, find the value of R_L for maximum power transfer. What is the value of maximum power?



8 Find the voltage across 20 Ω resistor using superposition theorem and verify it using nodal analysis.



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Code: 9A04301

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Draw the forward characteristic of semiconductor diode and briefly explain the method of obtaining the characteristic.

(b) Mention the reason for silicon devices to work at higher temperatures when compared to germanium devices with necessary energy band diagrams.

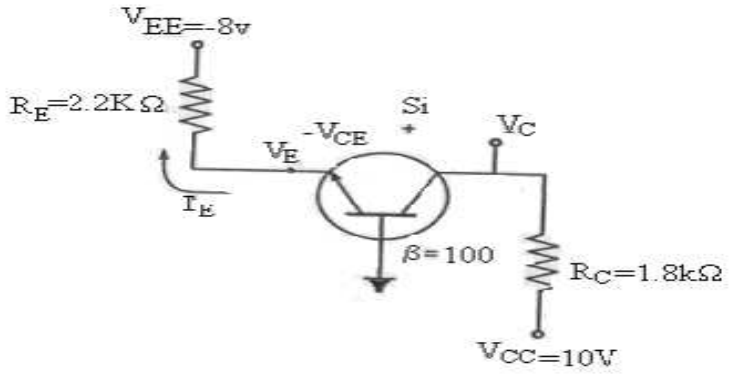
2 (a) Derive an expression for ripple in a π-section filter when used with a half wave rectifier.

(b) A full-wave single phase rectifier employs a π-section filter consisting of two 4 μF capacitances and a 20 H choke. The transformer voltage to the center tap is 300 V_{rms}. The load current is 500 mA. Calculate the dc output voltage and the ripple voltage. The resistance of the choke is 200 Ω.

3 (a) Define α, β, γ of a transistor and show have they are related to each other.

(b) Why does the CE configuration provide large current amplification while CB does not?

4 (a) For the circuit shown below, determine I_E, V_C and V_{CE}. Assume V_{BE} = 0.7 V.



(b) Compare the advantages and disadvantages of biasing schemes.

5 (a) Explain the construction and its operation of N-channel JFET with neat diagram.

(b) Explain JFET parameters.

6 (a) Draw the two biasing circuits for JFET and explain.

(b) Briefly explain the small signal model of JFET.

7 (a) Draw the hybrid equivalent circuits for CB, CE and CC configurations.

(b) Define h-parameters along with its units.

8 (a) Explain the working principle of UJT with its characteristics.

(b) Define the gate power dissipation and explain its importance in SCR.

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Code: 9A04303 R09

B.Tech II Year I Semester (R09) Supplementary Examinations, May 2013

PROBABILITY THEORY & STOCHASTIC PROCESSES

(Common to EIE, E.Con.E and ECE)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain about theorem of total probability.

(b) Given that two events A_1 and A_2 are statistically independent, show that:
(i) A_1 is independent of $\bar{A}$. (ii) $\overline{A_1}$ is independent of A_2. (iii) $\overline{A_1}$ is independent of $\overline{A_2}$.

2 (a) Write short notes on binomial distribution.

(b) A random variable x has the following distribution.

xi	0	1	2	3	4	5	6	7	8
$p(xi)$	a	3a	5a	7a	9a	11a	13a	15a	17a

(i) Find 'a'
(ii) Find $P(X \leq 3), P(X \geq 3)$ and $P(0 < X < 5)$
(iii) Find the smallest value of $'x'$ for which $P(X \leq x) > 0.5)$
(iv) Find the CDF $F_X(x)$.

3 (a) Write short notes on central moments and moments about the origin.

(b) A random variable X has a probability density

$$f_X(x) = \begin{cases} (1/2)\cos(x) & -\pi/2 < x < \pi/2 \\ 0, & else\ where \end{cases}$$

For the function $g(X) = 2X^4$
(i) Find the mean value. (ii) Find the variable.

4 (a) Write short notes on sum of two random variables.

(b) Let $f_{XY}(x,y) = x + y\ for\ 0 \leq x \leq 1,\ 0 \leq y \leq 1$
= 0 elsewhere.
Find the conditional density of: (i) X given Y. (ii) Y given X.

5 (a) What is a linear transformation explain interns of Gaussian random variable.

(b) Random variables X and Y have the joint desnity

$$f_{XY}(x,y) = \begin{cases} (1/24) & 0 < x < 6\ and\ 0 < y < 4 \\ 0, & else\ where \end{cases}$$

What is the expected value of the function $g(X,Y) = (XY)^2$?

6 (a) Define and differentiate between random variable and random process.

(b) A random process is defined as $X(t) = A\cos(\omega t + \theta)$ where A is a constant and $'\theta'$ is a random variable, uniformly distributed over $(-\pi, \pi)$ check X(t) for stationarity.

7 (a) Explain the cross covariance and correlation coefficient.

(b) Two random processes U(t) and V(t) are defined as U(t) = X(t) + Y(t) and V(t) = 2 – X(t)+3 Y(t), where X(t) and Y(t) are two orthogonal stationary processes. $R_{uu}(\tau)$, $R_{vv}(\tau)$, $R_{uv}(\tau)$ in terms of $R_{XX}(\tau)$ and $R_{YY}(\tau)$.

8 (a) Derive the relationship between cross-power spectrum and cross-correlation function.

(b) The auto correlation function of an a periodic random process is $R_{XX}(\tau) = exp\left[-\frac{x^2}{2\sigma^2}\right]$. Find the PSD and average power of the signal.

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Code: 9A04304

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

SIGNALS & SYSTEMS

(Common to EIE, E.Con.E, ECE & ECC)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Write short notes on "Orthogonal Functions".

(b) Define the following elementary signals:

(i) Real exponential signal.

(ii) Continuous time version of a sinusoidal signal and bring out the relation between sinusoidal and complex exponential signals.

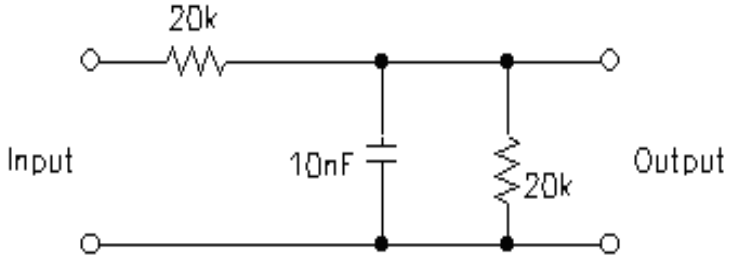
2 (a) Explain the concept of generalized Fourier series representation of signal f(t).

(b) State the properties of Fourier series.

3 (a) Find the Fourier transform of symmetrical triangular pulse and sketch the spectrum.

(b) State and prove symmetry property of Fourier transform.

4 Determine the maximum bandwidth of signals that can be transmitted through the low pass RC filter shown in figure; if over this bandwidth the gain variation is to be within 10 percent and the phase variation is to be within 7 percent of the ideal characteristics.



5 (a) What is sampling? Explain the need for sampling and hence discuss various types of sampling.

(b) Explain clearly the process of sampling for low pass signals and derive conditions for optimum reconstruction of signal.

6 (a) Explain the difference between correlation and convolution with an example.

(b) Find the autocorrelation of a triangular function.

7 (a) Determine the Laplace transform, associated region of convergence and pole-zero plot for the following function: $x(t) = e^{-2t}u(t) + e^{-3t}u(t)$.

(b) State and prove time shifting and shifting in S-domain properties of Laplace transform.

8 (a) Find the inverse transform of $X(z) = \frac{z^2}{(z-a)^2}, |z| > |a|$ and 0<*a*<1 using the residual method.

(b) Use convolution theorem, to find the inverse z transform of $X(z) = \frac{z}{(z-1)^3}$.

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