Hall Ticket Number :										

Code : 1GC32 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Engineering Mathematics

(Common to EEE & ECE)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Find the Rank of the matrix $A=\begin{bmatrix}2 & -2 & 0 & 6\\ 4 & 2 & 0 & 2\\ 1 & -1 & 0 & 3\\ 1 & -2 & 1 & 2\end{bmatrix}$ by Reducing it to Canonical form. 7M

   b) Compute the Eigen values of the matrix A^{-1}, if $A=\begin{bmatrix}2 & 2 & 1\\ 1 & 3 & 1\\ 1 & 2 & 2\end{bmatrix}$ 7M

2. a) Compute the root of the Equation $x.\log_{10}{}^{(x)}=1.2$ using False position method. 7M

   b) Using Newton-Raphson method find a Numerical root of the Equation $x\sin x+\cos x=0$,which is near $x=®$. 7M

3. a) Obtain a relation of the form $y=a.b^x$ for the data $y(2)=8.3$, $y(3)=15.4$, $y(4)=33.1$, $y(5)=65.2$, $y(6)=127.4$, by the Method of Least squares. 7M

   b) Calculate the coefficient of correlation between age of cars and annual maintenance cost and comment

Age of cars (years)	2	4	6	7	8	10	12
Annual Maintenance cost (Rupees)	1600	1500	1800	1900	1700	2100	2000

   7M

4. a) Solve $2z+p^2+qy+2y^2=0$ by using Charpit's Method. 7M

   b) Form the Partial Differential equation by eliminating the arbitrary constants : $x^2+y^2+(z-c)^2=a^2$ 7M

5. a) Find the Half-Range Sine series for $f(x)=x(®-x)$, in $0<x<®$ and Deduce that $\frac{1}{1^3}-\frac{1}{3^3}+\frac{1}{5^3}-\frac{1}{7^3}+\ldots\ldots\ldots=\frac{®^2}{32}$ 7M

   b) Obtain the Fourier series for $f(x)=x-x^2$ in the Interval $[-®,®]$. 7M

6 a) Find the Fourier Transform of $f(x)=\begin{cases}a^2-x^2, if\ |x|<a\\ 0, if\ |x|>a>0\end{cases}$, and Hence Show that $\int_0^{\sim}\frac{\sin x-\cos x}{x^3}dx=\frac{®}{4}$. 14M

7. a) A Random variable X has the following probability function:

X	0	1	2	3	4	5	6	7
$p(X)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

   (i) Determine k.

   (ii) Evaluate $p(X<6)$, $p(X\geq 6)$, $p(0<X<5)$ and $p(0\leq X\leq 4)$.

   (iii) If $p(X\leq k)>\frac{1}{2}$, Find the minimum value of k and

   (iv) Determine the distribution function of X. (v) Mean (vi) Variance 14M

8 a) Define Binomial Distribution and deduce Mean and Variance 7M

   b) In a Normal Distribution 31% of the items are under 45 and 8% are over 64. Find the Mean and Variance of the Distribution. 7M

***

Hall Ticket Number :										

Hall Ticket Number :
Code : 1G331

R-11 / R-13

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Electronic Circuits

(Electronics & Communication Engineering)

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

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

****

1. a) Describe the effects of different distortions in amplifiers 6M
   b) A CE amplifier is driven by a voltage source of internal resistance R_s=600Ω and load impedance is R_L=1100Ω.The h parameters are h_{ie}=1KΩ, h_{re}=2x10^{-4}, h_{fe}=50 and h_{oe}=25μA/V. Compute the current gain A_I ,input resistance R_i, voltage gain A_V and output resistance R_O with exact model. 8M

2. a) List the advantages and disadvantages of RC coupling. 4M
   b) Explain cascode amplifier and derive voltage gain. 10M

3. a) What is the effect of emitter bypass capacitor on low frequency response 7M
   b) A CE amplifier have the h parameters h_{ie}=10KΩ, and, h_{fe}=400. The circuit has R_S=600Ω, R_L=5KΩ R_E=1KΩ, V_{CC}=12V, R_1=15KΩ, R_2=2.2KΩ and C_E=50μF Compute the mid frequency voltage gain and lower 3-db point. 7M

4. a) Why positive feedback is not suitable in amplifiers. 4M
   b) Derive the feedback, input resistance ,voltage gain and output resistance of current series feedback circuit 10M

5. a) What is the condition for oscillations 4M
   b) For the colipitts oscillator using BJT in self-bias having R=1500Ω and the feedback elements C_1=0.018μF, C_2=0.16μF find the values of feedback fraction, minimum gain to sustain oscillations and emitter resistor R_E. 10M

6. a) Give the classification of large signal amplifiers 4M
   b) Explain complementary symmetry push pull amplifier 10M

7. a) Derive the expression for Q-factor 4M
   b) Derive the relation of cascading effect on bandwidth in single tuned amplifier. 10M

8. a) What is line and load regulations 7M
   b) Explain the necessity of overload voltage protection 7M

***

Hall Ticket Number :										

Code : 1G236 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Electrical Circuit Theory

(Electronics & Communication Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Obtain the expression for star-delta equivalence of resistive network? 7M

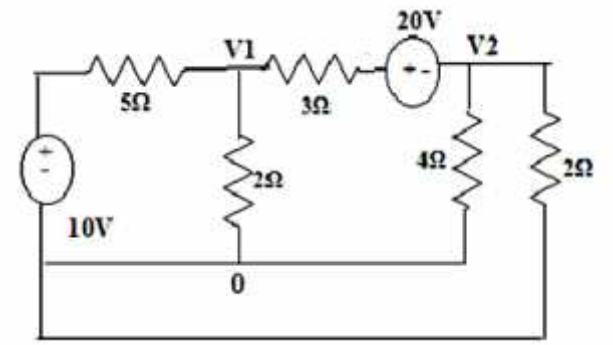
   b) current i= 10 e^{-t} is applied to

   i. a 3Ω resistor ii) a 2H inductor and iii) a 0.1F capacitor,

   What are the respective voltages? Write down expression for power in each case. 7M

2. a) Write steps involved in the Mesh Analysis with suitable example? 6M

   b) Obtain currents through various elements in the circuit using nodal method



8M

3. a) Define the following

   i. RMS value **ii**. Average value **iii**. Form factor of an alternating quantity 6M

   b) Obtain the rms value, average value, form factor and peak factor for a voltage of symmetrical square shape whose amplitude is 10V and time period is 40secs. 8M

4. a) Derive the Expression for i(t) series R-L circuit when excited by a sinusoidal source. 7M

   b) For the RLC series circuit R=5ohms, L=0.03H, C=100 microfarads. Determine the Frequency at which the circuit resonates. Also find the quality factor, voltage across the inductance, voltage across capacitance, at resonance 7M

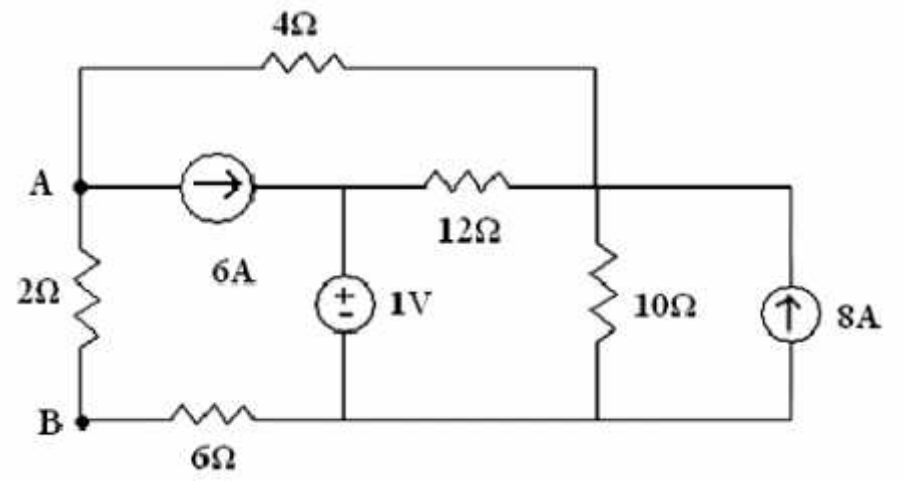
5. a) Explain three phase power measurement by 2 wattmeter method for star and delta connected load and determine the power equation and draw the phasor diagram 8M

   b) A balanced abc-sequence Y-connected source with Van=100$\angle 10^{\circ}$V is connected to delta connected balanced load (8+j4) ohm per phase. Calculate the phase and line currents 6M

6. a) Define MMf, Flux density, Magnetising force and Permeability and specify merits for each of the above quantities. 6M

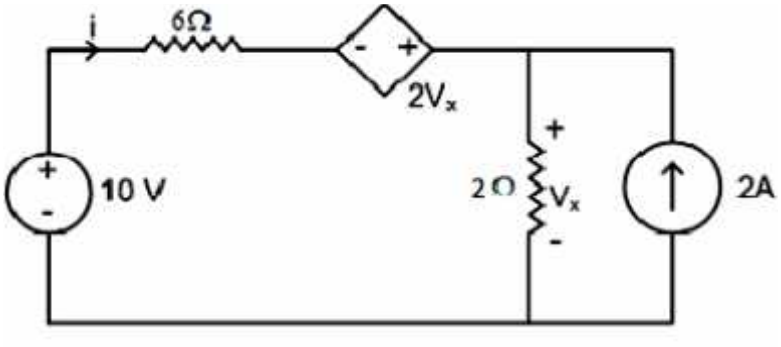
   b) An iron ring 15Cms in diameter and 10Cm^2 in area of cross section is wound with a coil of 200 turns. Determine the current in the coil to establish a flux density of 1Wb/m^2 if the relative permeability of iron iron is 500. In case if an air gap of 2mm is cut in the ring, what is the current in the coil to establish the same flux density? 8M

7. a) Find the current through the 2Ω resistor using thevenins theorem?



7M

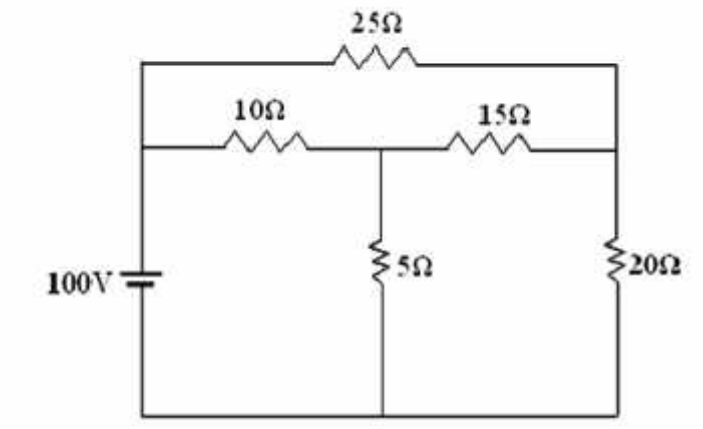
b) Find the current i in the circuit shown in fig, given below using superposition theorem



7M

8. a) State and explain compensation theorem? 7M

b) Verify tellegen's theorem for circuit shown below?



7M

****

Hall Ticket Number :										

Code : 1G332 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

Pulse & Digital Circuits

(Electronics & Communication Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Derive the output and draw the response of high pass RC circuit for square wave input. 7M
   b) What is an attenuator? Explain the under and over compensation in attenuator. 7M

2. a) Draw the voltage comparator response for ramp input signal. State the comparator applications. 7M
   b) Design a diode clamper circuit to clamp the positive peaks of the input signal at zero level.The frequency of the input signal is 500 Hz. 7M

3. a) Explain the switching characteristics of transistor. 7M
   b) Explain the piecewise linear characteristics of diode 7M

4. a) Explain the operation of astable multivibrator with circuit diagram and relevant waveforms. 7M
   b) Design a one shot multivibrator to develop an output pulse of 500-µsec duration. Assume $h_{fe(\min)} = 25$, $I_{c(sat)}$ =5mA, $V_{cc} = 10V, and\ V_{BB}$ =- 4V 7M

5. a) Derive the expression for slope error and sweep speed for the bootstrap sweep circuit. 7M
   b) Draw the simple current sweep circuit? Explain its working with the help of diagram. 7M

6. a) Draw the circuit of bidirectional sampling gate using diodes. Derive the expression for gain. 7M
   b) What do you mean by pedestal? How pedestal can be reduced in sampling gate. 7M

7. a) Explain the principle of synchronization and frequency division in blocking oscillator. 7M
   b) Draw and explain the block diagram of frequency divider without phase jitter. 7M

8. a) Explain the operation of a NANAD gate with the help of a circuit diagram. 7M
   b) Draw the circuit diagram of COMS NOR and NAND gates and explain their operation. 7M

***

Hall Ticket Number :										

Code : 1G333 **R-11 / R-13**

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2015

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 Joint, Conditional and Total Probability. 6M

   b) In a box there are 100 resisters having resistances and tolerances as shown in table. Let a resistor be selected from the box and assume each resistor has the same likelihood of being chosen. Define three events: A as "draw a 47 Ω resistor", B as draw a resistor with 5% tolerance", and C as "draw a 100 Ω resistor". Calculate P(A∩B), P(A∩C) P(B∩C),P(A/B), P(A/C) and P(B/C).

Resistance(?)	Tolerance		
	5%	10%	Total
22	10	14	24
47	28	16	44
100	24	8	32
Total	62	38	100

8M

2. The exponential density function is given below. Calculate E[X], $E[X^2]$, σ_x^2, Skew and coefficient of Skewness.

$$f_x(x) = \begin{cases} \frac{1}{b} e^{-(x-a)/b} & x > a \\ 0 & x < a \end{cases}$$

14M

3. a) Define Joint characteristic function. How joint moments can found from Joint characteristic function. 6M

   b) Two random variables X and Y have zero-mean and its Joint characteristic function is given below. Assume X and Y are uncorrelated. Calculate R_{XY}.

$$\varphi_{X,Y}(\omega_1, \omega_2) = e^{(-2\omega_1^2 - 8\omega_2^2)}$$

8M

4. Define Linear time-invariant system. Derive the expression for Power density spectrum of response of linear time-invariant system. 14M

5. Define noise band width and Explain Modeling of noise Sources? 14M

6. State Ergodic Theorem. Derive the expression for mean-Ergodic and correlation-Ergodic processes 14M

7. a) Define Cross-correlation function and Co-variance function. 6M

   b) Explain Gaussian random processes 8M

8. Derive relationship between Power spectrum density and Auto-correlation function 14M

***