Hall Ticket Number :										

R-14

Code: 4G343

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Analog Communication

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A broadcast AM transmitter radiates 106KW of carrier power, modulated to 60%.
   i) What is total modulated power?
   ii) What is total side band power 7M
   b) With neat block diagram explain the detection of AM using envelope detector. Explain how RC time constant is selected. 7M

OR

2. a) Calculate the percentage power saving when the carrier and one of the side bands are suppressed in an AM wave modulated to a depth of
   i) 100% ii) 50% 7M
   b) What is the need of VSB modulation? Why VSB transmission is widely used for TV broadcasting. 7M

UNIT–II

3. a) Explain Reactance method of generation of FM signal. Discuss its basic principle of operation. 8M
   b) i) Compare NBFM and WBFM.
   ii) Show that average power of FM carrier is constant. 6M

OR

4. a) Draw the circuit of Balanced slope detector of FM demodulation and explain its operation. 7M
   b) Explain with block diagram the PLL method of FM demodulation. 7M

UNIT–III

5. a) Explain the noise performance of DSB- SC receiver and prove its S/N ratio is unity. 8M
   b) Explain the concept of pre-emphasis & de-emphasis and mention its necessity. 6M

OR

6. a) Derive the Noise figure in Frequency modulation. 8M
   b) Explain threshold effect in Angle modulation. 6M

UNIT–IV

7. a) Draw the block diagram of AM transmitter using High level modulation and explain the significance of each block. 8M

   b) What is an Amplitude Limiter? Explain its operation with a neat circuit Diagram. 6M

OR

8. a) Classify Radio transmitters according to the type of modulation, service involved and frequency range involved. 6M

   b) The RF frequency, local oscillator frequency and IF frequencies of an AM receiver are $f_s = 800$ $f_l = 1255$KHz and I.F = 455KHz respectively

      i. Determine image frequency.

      ii. Image frequency rejection ratio for a loaded Q of 120. 8M

UNIT–V

9. a) Explain the generation and detection of PWM signals with neat diagram. 8M

   b) Explain Time division multiplexing scheme. 6M

OR

10. a) Explain the generation and demodulation of a PAM signal with neat circuit diagram. 6M

    b) Explain the generation and demodulation of a PPM signal. 8M

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Hall Ticket Number :										

Code: 4G344

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Field Theory and Transmission Lines

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) State Gauss's law and obtain point form of first Maxwell's equation? 8M

   b) Find the gradient of the following scalar fields:
   $(i) V = e^{-z} sin2x\ cosh y$
   $(ii) U = \rho^2 z\ cos2\phi$
   $(iii) W = 10 r sin^2\theta\ cos\phi$ 6M

OR

2. a) Derive and obtain the relation between electric field intensity and electric potential? 8M

   b) A point charge $10\ pC$ is located at $(4,1,-3)$ while the x-axis carries charge $2\ nC/m$. If the plane $z = 3$ also carries $5\ nC/m^2$. Find E at $(1,1,1)$? (Represent graphically with relevant co-ordinate system)? 6M

UNIT–II

3. a) Discuss convection and conduction currents, hence derive point form of ohms law? 8M

   b) If $J = \frac{1}{r^3}(2cos\theta a_r + sin\theta a_\theta)\ A/m^2$. Calculate the current passing through (i) A hemispherical shell of radius $20\ cm$ (ii) A spherical shell of radius $10\ cm$ 6M

OR

4. a) Derive the expression for a capacitance of coaxial capacitor with neat schematic? 8M

   b) A dielectric sphere ($\varepsilon_r = 2.7$) of radius10 cm has a point charge $2\ \mu C$ placed at its center. Calculate (i) The surface density of polarization charge on the surface of the sphere. (ii) The force exerted by a charge on a $-4\ pC$ point charge placed on the sphere. 6M

UNIT–III

5. a) Derive the expression of H for line current distribution using Biot – Savart's law along with graphical representation? 8M

   b) A steady state current of $I\ amps$ flow in a conductor bent in the form of square loop of side 'a'. Find the magnetic field intensity at the centre of the loop? 6M

OR

6. a) Explain about the inconsistency of ampere's law and derive a Maxwell's expression of $\nabla \times H$ for Time Varying EM fields? 8M

   b) In air, $E = \left(\frac{sin\theta}{r}\right) cos[(6 \times 10^7 t) - \beta r]\ a_\theta\ V/m$. Find β and H? 6M

UNIT–IV

7. a) Derive the expressions of α, β, η, E & H for a lossy medium? 8M

   b) In EM wave the expression is of $\alpha, \beta,$ ce with electric d medium nent $E^s = 100 e^{j(0.866y+0.5z)} a^x V/m.$ Determine (i) ω (ii) λ and (iii) magnetic field component? 6M

OR

8. a) Derive and obtain the relation between reflection coefficient and transmission coefficient due to reflection of plane waves at normal incidence? 8M

   b) In free space $H = 0.2 \cos(t - x) a^z A/m$. Find total power through (i) a square plate of side 10 cm on plane $x + z = 1$. (ii) a circular disc of radius 5 cm on plane $x = 1$? 6M

UNIT–V

9. a) Derive secondary constants in terms of primary constants of a transmission line? 8M

   b) The short circuit and open circuit impedance at 800 Hz of a 40 km long transmission line are $3200\angle -80^0\Omega$ and $1300\angle 80^0\Omega$ respectively. Calculate the line constants R, L, G, c? 6M

OR

10. a) Explain how quarter wave transformer is used for load matching and impedance measurement of a transmission line? 8M

    b) A telephone line has the following parameters: R=40 Ω/m, L=0.2 mH/m, G=400 μS/m, and C=0.5 nF/m. (i) If the line operates at 10 MHz, calculate the characteristic impedance and velocity (ii) After how many meters will the voltage drop by 30 dB in the line? 6M

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Hall Ticket Number :										

Code: 4G245

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Electrical Technology

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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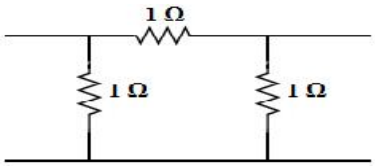
UNIT–I

1. a) Derive Z-Parameters in terms of ABCD-Parameters 7M

   b) Obtain y-parameters for the given network



7M

OR

2. a) Derive the condition of reciprocity & symmetry for y- parameters 7M

   b) Explain ABCD-Parameter model of a passive two port network. Mention its applications 7M

UNIT–II

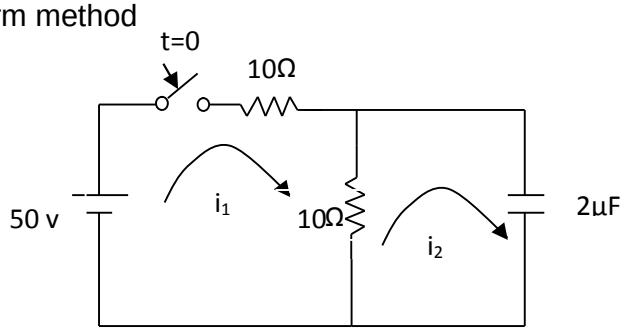
3. a) Obtain the expression for RL series circuit, excited by DC source at t=0 7M

   b) Obtain the expression for current in RL series circuit, excited by $v(t) = v_m \sin(\omega t + \emptyset)$ at t=0. Assume zero initial condition 7M

OR

4. a) In a series RL circuit with R= 3Ω, L = 1H, DC voltage of 50V is applied at t = 0. Find the expression for current. Assume zero initial conditions 7M

   b) In a two mesh network shown below, obtain the currents i_1 and i_2 using Laplace transform method



7M

UNIT–III

5. a) Write a short note on Band stop filter 7M

   b) Design a constant-k low pass filter to match with a line having characteristic impedance of 500Ω and to pass frequency up to 5kHz. 7M

OR

6. a) What is an attenuator? Derive the design equations for T-type attenuator 7M

   b) Explain the analysis of prototype band pass filter 7M

UNIT–IV

7.	a)	Explain the working principle of a simple loop DC Generator with neat sketch	7M
	b)	Derive EMF equation of a DC Generator.	7M

OR

8.	a)	Explain the principle of operation of a DC motor in detail	7M
	b)	Explain the operation of a 3 point starter with neat sketch	7M

UNIT–V

9.	a)	A 30KVA, transformer has 500 primary and 30 secondary turns. The primary is connected to a 3300V ac supply. Neglecting losses, Calculate (**i**) the secondary voltage (**ii**) the maximum flux in the core and (**iii**) the primary and secondary currents	7M
	b)	Explain OC and SC Test on transformer	7M

OR

10.	a)	Explain the operation of a single phase transformer with the help of relevant diagram	7M
	b)	Explain the principle of operation of capacitor start motor.	7M

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Hall Ticket Number :										

Code: 4GC41

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Mathematics – III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Evaluate $\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}$ 7M

   b) If $\tan(x+iy)=u+iv$ then show that $u\sinh 2y = v\sin 2x$. 7M

OR

2. a) Evaluate $\int_{0}^{\frac{\pi}{2}} \sin^{\frac{7}{2}}\theta\ \cos^{\frac{3}{2}}\theta\ d\theta$. 7M

   b) Separate the real and imaginary parts of $\tanh z$. 7M

UNIT–II

3. a) Apply C-R conditions to $f(z)=z^3$ and show that the function is analytic everywhere. 4M

   b) If $f(z)=u+iv$ is analytic function of z and if $u-v=e^x(\cos y-\sin y)$, find $f(z)$ in terms of z. 10M

OR

4. a) Suppose $f(z)=u+iv$ is an analytic function. If $u=x(x^2-3y^2)$, find harmonic conjugate $v(x,y)$ and write the corresponding complex potential $f(z)=u+iv$. 7M

   b) If $f(z)=u+iv$ is an analytic function. Show that the family of curves defined by $u(x,y)=c\text{constant}$ cuts orthogonally the family of curves $v(x,y)=c\text{constant}$. 7M

UNIT–III

5. a) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is $|z|=3$ using Cauchy's integral formula 7M

   b) Expand the function $f(z)=\frac{z-1}{z^2}$ in a Taylor series with center $z_0=1$ then find its radius of convergence. 7M

OR

6. a) Evaluate $\int_c \frac{1}{z}dz$, where c is the circle defined by $x=\cos t, y=\sin t, 0\le t\le 2\pi$ 4M

   b) Find the Laurent's series expansion of $f(z)=\frac{1}{(z-1)(z-2)}$ for $1<|z|<2$ and hence, evaluate $\int_C f(z)\,dz$, where $C:|z|=1.5$. 10M

UNIT–IV

7. a) Determine the poles of the function $f(z)=\frac{1}{(z-1)(z-3)}$ and find the residue at each pole. 6M

   b) Evaluate the real integral $I=\int_0^{2\pi}\frac{1}{2+Cos\theta}d\theta$ using residue theorem. 8M

OR

8. a) State and Prove argument principle. 7M

   b) Prove that all the zeros of $z^7-5z^3+12=0$ lie between the circles $|z|=1$ and $|z|=2$. 7M

UNIT–V

9. Consider the points $1,i,-1$ in z-plane is mapped onto the points $i,0,-i$ in w- plane under a bilinear transformation $f(z)$.

   (i) Determine the bilinear transformation $f(z)$.

   (ii) Find the image of $|z|<1$ under $f(z)$.

   (iii) Find the Invariant points of $f(z)$. 14M

OR

10. a) Find the bilinear transformation which maps $z=\infty,i,0$ onto the points $w=0,i,\infty$ 7M

    b) Find the image of the line $x=4$ in z-plane under the transformation $w=z^2$. 7M

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Hall Ticket Number :										

R-14

Code: 4G341

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Random Variables and Random Processes

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the various distribution functions. 7M

   b) A die is tossed. Find the probabilities of the events A={odd number shows up}, B={number larger than 3 shows up}, A U B and A ∩ B. 7M

OR

2. a) With an example explain the following:
   i) Equality likely events
   ii) Exhaustive events.
   iii) Mutually exclusive events. 7M

   b) In three boxes, there are capacitors as given in the table. An experiment consists of first randomly selecting a box, assuming each has same likelihood of selection, and then selecting a capacitor from chosen box
   i) What is the probability of selecting a 0.01μF capacitor, given that box-2 is selected?
   ii) if a 0.01μF capacitor is selected, what is the probability it came from box-3

Number in the box				
Value (μF)	**1**	**2**	**3**	**Totals**
0.01	20	95	25	140
0.1	55	35	75	165
1.0	70	80	145	295
Totals	145	210	245	600

7M

UNIT–II

3. a) Define the following with examples:
   i) Moment
   ii) Central moments
   iii) Variance and skew 6M

   b) A discrete random variable X has possible values $x_i = i^2$, i = 1,2,3,4,5 which occur with probabilities 0.4, 0.25, 0.15, 0.1 and 0.1 respectively. Find the mean value of X. 8M

OR

4. a) Explain role of characteristic function of a Random Variable X and its advantage. 7M

   b) Explain Chebyshev's Inequality. 7M

UNIT–III

5. a) A joint sample space for two random variables X and Y has four elements (1,1), (2,2), (3,3) and (4,4). Probabilities of these elements are 0.1, 0.35, 0.05 and 0.5 respectively.
   i) Sketch the distribution function FXY (x, y)
   ii) Find the probability of the event $\{X \leq 2.5, Y \leq 6\}$
   iii) Find the probability of the event $\{X \leq 3\}$ 8M

   b) Briefly explain the concept of jointly Gaussian random variables. 6M

OR

6. a) Briefly explain central limit theorem. 7M

   b) Explain the Distribution and Density functions of Sum of Two Random Variables. 7M

UNIT–IV

7. a) Explain the classification of different Random processes with neat graphs. 7M

   b) Explain the concept of Stationarity and independence. 7M

OR

8. a) A random process is defined by $Y(t)= X(t) \cos(\omega_0 t+\varphi)$ where X(t) is a wide sense stationary random process that amplitude modulates a carrier of constant angular frequency ω_0 with a random phase φ independent of X(t) and uniformly distributed on $(-\pi,\pi)$
   i) Find E[Y(t)]
   ii) Find the auto correlation of Y(t)
   iii) Is Y(t) a WSS? 7M

   b) Define cross correlation function of two random processes X(t) and Y(t) and state the properties of cross correlation function. 7M

UNIT–V

9. a) Define power density spectrum and list its properties. 7M

   b) Consider a random processes $X(t)= A \cos(\omega_0 t+\varphi)$ where A and ω_0 are real constants and φ is a random variable uniformly distributed over the interval $(-\pi,\pi)$. Find the average power in X(t). 7M

OR

10. a) Derive the relationship between cross power spectrum and cross correlation function. 9M

    b) Briefly explain the spectral characteristics of random processes. 5M

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Hall Ticket Number :										

R-14

Code: 4G342

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Switching Theory and Logic Design

(Electronics & Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Perform $(15)_{10} = (28)_{10}$ using (i) 6-bit 1's complement (ii) 6-bit 2's complement representation. 6M

   b) The Hamming code 101101101 is received. Correct it if any errors. There are four parity bits and odd parity is used. 8M

OR

2 a) Simplify the following Boolean expression

   (i) $AB + \overline{AC} + A\bar{B}C\,(AB + C)$ 2M

   (ii) $Y = \Sigma\, m\,(1,3,5,7)$ 3M

   (iii) Find the dual of the following expression 3M

   vwx + vwyz + wxy + vxyz

   b) Obtain XOR gate using

   (i) minimum number of NAND gates only and

   (ii) minimum number of NOR gates only. 6M

UNIT–II

3. a) Convert the given expression in standard POS form

   $F_1(A,B,C,D) = (A+B)(B+C)(A+C)$

   $F_2(P,Q,R) = (P+\bar{Q})(P+R)$ 7M

   b) Realize the following expressions using NAND and NOR logic separately

   Y = PQ' + QS + Q'RS' 7M

OR

4. Reduce the following Boolean expression using tabulation method and verify using k-map

   $Y = m_0 + m_2 + m_4 + m_6 + m_8 + m_{10} + m_{11} + m_{12} + m_{13}$ 14M

UNIT–III

5. a) Derive the necessary equations and then draw the circuit for the full adder circuit with two half adders and OR gate. 7M

   b) With neat sketch and function table, explain the 8:1 multiplexer. 7M

OR

6. a) Derive a BCD to excess-3 code converter using ROM. 7M

   b) Discuss about the functionality of a PAL. How its program table is prepared. 7M

UNIT–IV

7 a) What is race around condition? Explain how it can be eliminated in Jk master-slave flip-flop explain clearly. 7M

b) Design a T flip-flop using JK flip-flop. Use k-maps for the design. 7M

OR

8. a) Compare synchronous and asynchronous sequential circuits. 6M

b) Draw and explain the working of 3-bit synchronous up/down counter. 8M

UNIT–V

9. Convert the following Mealy machine into a corresponding Moore machine

PS\	NS , Z	
	X = 0	X = 1
A	C, 0	B, 0
B	A, 1	D, 0
C	B, 1	A, 1
D	D, 1	C, 0

14M

OR

10. a) Explain in detail the block diagram of ASM chart 7M

b) Draw a ASM chart for a 2-bit binary counter having one enable line E such that:
E = 1(counting enabled)
E = 0(counting disabled) 7M

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