Hall Ticket Number :										

R-14

Code: 4G344

II B.Tech. II Semester Supplementary Examinations December 2017

Field Theory and Transmission Lines

(Electronics and 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 and prove Gauss law and explain applications of gauss law. 7M

   b) Derive an expression for energy stored and energy density in electrostatic field. 7M

OR

2. a) Define divergence, gradient, curl in spherical co-ordinate system with mathematical expression 7M

   b) State and proof divergence theorem. 7M

UNIT–II

3. a) Derive an expression for series and parallel plate capacitor. 7M

   b) Derive an expression for capacitance of concentric spheres and for capacitance of co-axial cable. 7M

OR

4. a) Discuss the properties of dielectric materials. 7M

   b) Derive the boundary conditions of the normal and tangential components of electric field at the interface of two media with different dielectrics. 7M

UNIT–III

5. a) Derive General field relation for time varying electric and magnetic fields using Maxwell's' equations 7M

   b) Write a technical note on "Faradays law of electromagnetic induction". 7M

OR

6. a) Derive an expression for energy stored in a magnetic field. 7M

   b) Derive the Maxwell's equations in integral and differential forms. Hence derive standard wave equations. 7M

UNIT–IV

7. a) Derive the expression for the attenuation constant, phase constant and intrinsic impedance for a uniform plane wave in a good conductor. 7M

   b) Define and explain Polarization. Explain the types and significance of polarization in EM wave propagation with supporting equations. 7M

OR

8. a) Derive suitable relations for integral and point forms of Poynting theorem. 7M

   b) A plane wave propagating through a medium with $\varepsilon_r = 8$, $\mu_r = 2$ has $E = 0.5 \sin (108\ t - z)\ a_z$ V/m. Determine (i) The loss tangent (ii) Wave impedance (iii) Wave velocity (iv) H field 7M

UNIT–V

9. a) Derive the Telegraphic equations of transmission lines. 6M

   b) Explain the characteristics of distortion less transmission line and telephone cable. 8M

OR

10. a) Explain the principles of impedance matching using Single stub tuner and double stub tuner with diagrams. Differentiate SST from DST. 7M

    b) Derive the input impedance of a lossless line. For a shorted section of 75 ohm transmission line, $l = \lambda/4$, find the input impedance assuming $\alpha = 0$. 7M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations December 2017

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) Express the integrals $\int_0^\infty x e^{-x^8} dx \cdot \int_0^\infty x^2 e^{-x^4} dx$ in terms of Gamma functions. 8M

   b) Find the principal value of $\sqrt{2i}$. 6M

OR

2. a) Show that $\int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin\theta}} \cdot \int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta = \pi$ 7M

   b) Find the real and imaginary parts of $\cot z$ 7M

UNIT–II

3. a) State and prove Cauchy-Riemann equations in polar form and hence deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$ 7M

   b) Find an analytic function, whose real part is $\frac{\sin 2x}{(\cosh 2y - \cos 2x)}$ 7M

OR

4. Show that for $f(z) = \frac{2xy(x+iy)}{x^2+y^2}$ *if* $z \neq 0$ $= 0$ *if* $z = 0$ the C-R equations are satisfied at origin but derivatives of $f(z)$ at origin does not exist. 14M

UNIT–III

5. a) Evaluate, using Cauchy's integral formula $\int_c \frac{\sin\pi z^2 + \cos\pi z^2}{(z-1)(z-2)} dz$ where c is the circle $|z| = 3$ 7M

   b) Find the Taylor's expansion of $f(z) = \frac{1}{(z+1)^2}$ about the point $z = -i$ 7M

OR

6. a) Evaluate $\int_c z^2\, dz$ along the straight line from $z = 0$ to $z = 2 + i$ 7M

   b) Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in Laurent series valid for $0 < |z+1| < 2$. 7M

UNIT–IV

7. a) Find the sum of the residues of $f(z)=\dfrac{\sin z}{z\cos z}$ at its poles inside the circle $|z|=2$ 7M

   b) Use Rouche's theorem to solve $p(z)=z^9-2z^6+z^2-8z-2,\ C:|z|=1$ 7M

OR

8. a) Using Residue theorem, evaluate $\int_c \dfrac{3z^2+2}{(z-1)(z^2+9)}dz$, where C is the circle $|z-2|=2$. 7M

   b) State and prove Argument principle. 7M

UNIT–V

9. a) Discuss the transformation $w=\sin z$. 7M

   b) Find the bilinear transformation which maps the points $z=0,\ 1,\ \infty$ onto $w=-1,-i,\ 1$. 7M

OR

10. a) Show that $w=\dfrac{i-z}{i+z}$ maps the real axis of z-plane into the circle $|w|=1$ and the half plane $y>0$ into the interior of the unit circle $|w|=1$ in the w-plane. 7M

    b) Find the bilinear transformation which maps the points $z=1,i,-1$ onto $w=2,\ i,-2$ respectively. Find the fixed points of the transformation. 7M

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Hall Ticket Number :										

Code: 4G341

R-14

II B.Tech. II Semester Supplementary Examinations December 2017

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) Give Classical and Axiomatic definitions of Probability. 7M

   b) In a single throw of two dice, what is the probability of obtaining a sum of at least 10? 7M

OR

2. a) State and Prove bayes' Theorem. 7M

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

UNIT–II

3. a) What is the concept of Random Variable? Explain with a suitable example. 7M

   b) Define moment generating function and mention its properties. 7M

OR

4. a) Explain Chebyshev's Inequality. 7M

   b) A discrete random variable X has possible values x_n,=n, n=1,2,3 which occur with probabilities $p(x_n)=(0.5)^n$ Find E[X] and VAR(X). 7M

UNIT–III

5. a) State and explain the central limit theorem. 7M

   b) 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 ≤ 2.5, Y ≤ 6}
   Find the probability of the event {X ≤ 3} 7M

OR

6. a) Given the function $f(x,y) = \begin{cases} \\ 0 \end{cases}$ $for\ x^2+y^2<b$ $else\ where$
   (i) Find the constant 'b' so that this is a valid joint density function.
   (ii) Find $P(0.5\,b < x_2 + y_2 < 0.8b)$ 9M

   b) What are the properties of Jointly Gaussian Random variables? 5M

UNIT–IV

7. a) List and explain various properties of Autocorrelation function. 7M

   b) Given the Autocorrelation function of the processes:

$$R_{XX}(\tau) = 25 + \frac{4}{1 + 6\tau^2}$$

   Find the mean and variance of the process X(t). 7M

OR

8. a) Compare the Cross Correlation Function with Autocorrelation function. 7M

   b) Briefly explain the Time averages and Ergodicity of random processes. 7M

UNIT–V

9. a) Define Power Spectral Density? List out its properties. 9M

   b) Compute the average power of the process having power spectral density $\frac{6\omega^2}{1+\omega^4}$. 5M

OR

10. a) Briefly explain the Bandwidth of power density spectrum. 7M

    b) Derive the relationship between power spectrum and auto correlation function. 7M

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Hall Ticket Number :										

Code: 4G342

R-14

II B.Tech. II Semester Supplementary Examinations December 2017

Switching Theory and Logic Design

(Electronics and 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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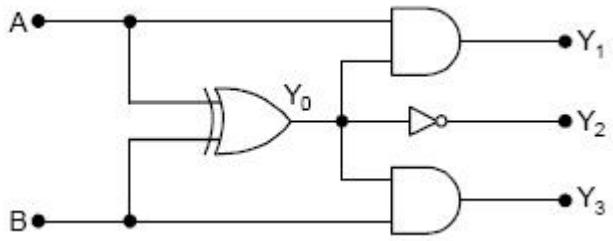
UNIT–I

1. a) Convert the following numbers as indicated:
   (i) Decimal 225.225 to binary, octal and hexadecimal.
   (ii) Binary 11010111.110 to decimal, octal and hexadecimal 7M

   b) The Hamming code 101101101 is received. Correct it if any errors. There are four parity bits and odd parity is used. 7M

OR

2. a) Determine the purpose of digital circuit of Fig.



8M

   b) Verify that the (i) NAND (ii) NOR operations are commutative but not associate. 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. a) What are the advantages of Tabulation method over K-map? Simplify the following Boolean function using Tabulation method.
   $Y(A,B,C,D) = \sum(0,1,2,3,5,7,8,9,11,14)$. 7M

   b) For the following function using K-map, Find minimal sum of products expression $T(W,X,Y,Z) = \sum(1,2,3,5,13) + d(6,7,8,9,11,15)$. 7M

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) Design a BCD-to Gray code converter using
   (i) 8:1 multiplexers (ii) dual 4 : 1 multiplexers and some gates. 9M

   b) For the given 3-input, 4-output truth table of a combinations circuit, tabulate the PAL programming table for the circuit.

Inputs			Output			
x	y	z	A	B	C	D
0	0	0	0	1	0	0
0	0	1	1	1	1	1
0	1	0	1	0	1	1
0	1	1	0	1	0	1
1	0	0	1	0	1	0
1	0	1	0	0	0	1
1	1	0	1	1	1	0
1	1	1	0	1	1	1

5M

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. Design a mod-6 synchronous counter using JK flip-flops. 14M

UNIT–V

9. What are the conditions for the two machines are to be equivalent? For the machine given below, find the equivalence partition and a corresponding reduced machine in standard form:

PS	NS,Z	
	X=0	X=1
A	F,0	B,1
B	G,0	A,1
C	B,0	C,1
D	C,0	B,1
E	D,0	A,1
F	E,1	F,1
G	E,1	G,1

14M

OR

10. a) What are the capabilities and limitations of an FSM 4M

    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) 10M

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Hall Ticket Number :										

R-14

Code: 4G343

II B.Tech. II Semester Supplementary Examinations December 2017

Analog Communication

(Electronics and 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) The antenna current of an AM broadcast transmitter modulated to a depth of 40% by an audio sine wave is 11 A. It increases to 12 A as a result of instantaneous modulation by another audio sine wave. What is the modulation index of the second wave? 5M

   b) With a neat circuit diagram, explain the principle of envelope detection of an amplitude modulated wave. 7M

   c) In an amplitude modulated signal if the total power is 600 W and the power in carrier is 400 W, what is the modulation index? 2M

OR

2. a) An AM signal is defined by x(t)=5cos 1000πt + 20cos 2000πt + 5cos 2200πt. Determine modulating signal m(t), the carrier and the modulation index. 4M

   b) A sinusoidal carrier $c(t) = 100\cos(2® 10^5 t)$ is amplitude modulated by a sinusoidal voltage $m(t) = 50\cos(2® 10^3 t)$ up to a modulation depth of 50%.

      i. Write down the expression for the modulated waveform.
      ii. Calculate amplitude and frequency of each sideband.
      iii. Find out the carrier power, sideband power and total power.
      iv. Draw the spectrum of the modulated waveform. 8M

   c) Does the signal $x(t) = \text{sinc}(f_0 t)$ is band limited or time limited? Explain. 2M

UNIT–II

3. a) Explain the relationship between FM and PM. 4M

   b) How many sidebands (theoretically) are there in an FM signal? Practically how many sidebands are considered and why? What is the corresponding bandwidth requirement? If the modulating frequency is increased from 10 kHz to 20 kHz, what happens to the bandwidth? (Assume initial bandwidth of B Hz). 8M

   c) What is the modulation index of FM signal having a carrier swing of 100 KHz and the modulation signal has frequency of 8 KHz? 2M

OR

4. a) Explain with necessary block diagram the demodulation of FM signal. 7M

   b) Explain Armstrong method of FM generation. 7M

UNIT–III

5. a) What is white noise? Draw the power spectral density of white noise. 4M

   b) If the maximum frequency deviation of an FM signal is doubled without changing the frequency of the sinusoidal modulating frequency, what happens to the output SNR? 4M

   c) Derive an expression for output SNR for DSB-SC system. 6M

OR

6. a) What is the role of pre-emphasis and de-emphasis filter in FM broadcasting. 8M

   b) Write short note on threshold in frequency modulation. 6M

UNIT–IV

7. a) What is a tuned radio frequency TRF receiver 7M

   b) Draw the block schematics of super heterodyne receiver and explain the operation of each block. 7M

OR

8. a) What do you mean by heterodyne? 2M

   b) Write short notes on
      i. AGC
      ii. frequency stability in FM Transmitter
      iii. Frequency changing and tracking 12M

UNIT–V

9. a) Explain how multiple channels are multiplexed using TDM. How does it is different from FDM. 8M

   b) Write short notes on Single polarity PAM and double polarity PAM 6M

OR

10. a) Two signals band limited to 3 and 5 kHz are to be time division multiplexed. Find the maximum permissible interval between two successive samples. 4M

    b) Describe with methods of generation of PWM and PPM signal. 10M

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Hall Ticket Number :										

R-14

Code: 4G245

II B.Tech. II Semester Supplementary Examinations December 2017

Electrical Technology

(Electronics and 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) Recall the necessary expressions for Y parameters in terms of Z parameters. 7M

   b) Two 2 port networks Y1 and Y2 are connected in parallel find the equivalent Y parameters 7M

OR

2. a) The Z parameters are $Z_{11}=4\Omega.Z_{12}=6.Z_{21}=3.Z_{22}=8$, find A.B.C ,D parameters. 7M

   b) Recall the condition of reciprocity and symmetry for y parameters. 7M

UNIT–II

3. a) A series R-C circuit has R=20Ω and C=4F .A dc voltage of V= 120V is applied at t=0. Find (i) the equations for current. voltage across Rand C (ii) the current at t-0.9 secs. 10M

   b) Recall the time constant of series R-L circuit and give its significance. 4M

OR

4. a) An uncharged 80μF capacitor is connected in series with a 1kΩ resistor and switch across a 110V supply. Determine the time constant of the circuit and the initial value of current flowing. Determine also the value of current flowing after (i) 40ms and (ii) 80ms. 7M

   b) A series RLC circuit is closed at t=0.The value of R =8Ω, L=5H and C= 8μF.The circuit is excited by V-80Vsource .Find i(0+),di(0+)/dt, and $d^2i(0+)/dt^2$ 7M

UNIT–III

5. a) Write short note on stop band filters 7M

   b) Design a constant-k high-pass filter to match with a line having characteristic impedance of 600Ω and to pass frequency above 5kHz. 7M

OR

6. a) What is an attenuator? Derive design equation of bridge T type attenuator. 7M

   b) Design T type attenuator to provide attenuation of 10dB. Taking characteristic impedance of 150 Ω. 7M

UNIT–IV

7. a) Describe with neat sketch the construction of dc machine. 7M

   b) The armature of 4 pole dc motor has a lap connected winding accommodating in 60 slots, each containing 20 conductors .If the useful flux per pole is 25m.Wb. Calculate the torque developed when the armature current is 60A. 7M

OR

8. a) Derive torque equation of dc motor? 7M

   b) A 4-pole, lap wound, DC generator has a useful flux of 0.07 wb per pole. Calculate the generated emf, when it is rotated at a speed of 900 rpm with the help of prime mover. Armature consists of 440 numbers of conductors. Also calculate the generated emf. If lap wound armature is replaced by wave wound armature. 7M

UNIT–V

9. a) Derive emf equation of single phase transformer. 5M

   b) The OC and SC tests on a 10 kVA , 125/250 V ,50Hz. 1 phase transformer gave the following results: OC test: 125 V. 0.7A, 50 W(on LV side); SC test : 15 V, 32 A, 100 W(on HV side) .Calculate full load efficiency at 0.86 leading and half load efficiency at 0.8 laggging. 4M

OR

10. a) Explain the operation of capacitor start and run motor. 7M

    b) Explain the operation of stepper motor. 7M

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