Hall Ticket Number :										

R-11 / R-13

Code: 1G342

II B.Tech. II Semester Supplementary Examinations May 2018

Electromagnetic Waves and Transmission Lines

(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 explain Coulomb's law and field intensity. 7M
   b) Point charges 1 mC and -2mC are located at (3, 2, -1) and (-1, -1, 4), respectively. Calculate the electric force on a 10 nC charge locate at (0, 3, 1) and the electric field intensity at that point. 7M

2. a) Distinguish between conduction and convection currents. 6M
   b) Derive Poisson's and Laplace's equations from fundamentals. List few of its applications concerned to electrostatic fields. 8M

3. a) A circular loop located on $x^2+y^2 = 9$, $z = 0$ carries a direct current of 10 A along $\mathbf{a_\phi}$. Determine **H** at (0, 0, 4) and (0, 0, -4). 7M
   b) Explain the concept of magnetic scalar and vector potential concepts. 7M

4. a) State Ampere's circuit law? Explain any two applications of Ampere's circuit law. 7M
   b) Derive the boundary conditions at the interface between Dielectric-Dielectric. 7M

5. a) Explain the wave propagation in lossy dielectric and derive the necessary equations. 7M
   b) A uniform plane wave propagating in a medium has
   $$E= 2\, e^{-\alpha z} \sin(10^8 t - \beta z) a_y \text{ V/m}$$
   If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 20$ and $\sigma = 3$ S/m, find α, β and H. 7M

6. a) What is poynting theorem? Derive the expression for poynting vector. 7M
   b) Write short notes on normal incidence of a plane wave on a perfect dielectric. 7M

7. a) List out different types of transmission lines and write its applications. 7M
   b) A distortion less line has $Z_0 = 60\Omega$, $\alpha = 20$ mNp/m, $u = 0.6$ c, where c is the speed of light in a vacuum. Find R, L, G, C and λ at 100 MHz. 7M

8. a) Write short notes on
      (i) Reflection coefficient
      (ii) VSWR 7M
   b) Explain double stub matching with suitable diagram. 7M

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Hall Ticket Number :										

Code : 1G246

R-11 / R-13

II B.Tech. II Semester Supplementary Examinations May 2018

Electrical Technology

(Electronics and Communication Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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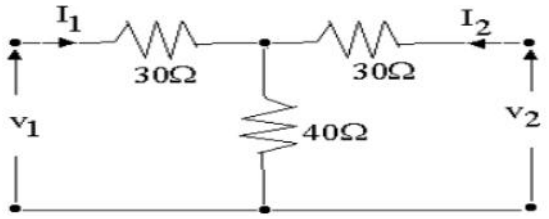
1. a) Derive an expression for transient response in RC series circuit with DC excitation. 7M

   b) Derive the transient response of series R-L-C circuit, with DC input, using Laplace transform.

   i. Derive the necessary differential equation and solve.

   ii. Discuss the cases of over-damping, critical –damping and underdamping**.** 7M

2. a) For the symmetrical 2-port network shown in Fig bellow find ABCD-parameters.

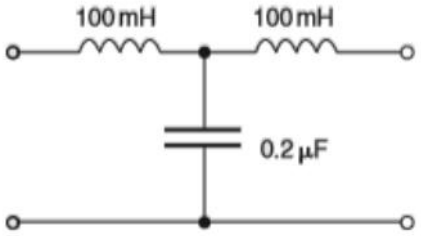


7M

   b) Explain inter connection of two port networks in series and cascaded configurations. 7M

3. a) Explain briefly constant-k Low pass filter and high pass filter. 7M

   b) Determine the cut-off frequency and the nominal impedance of the low-pass filter sections shown



7M

4. a) Define attenuator and explain π -type attenuator with necessary equations. 7M

   b) Design a T-type attenuator to give an attenuation of 60dB and to work in line of 500 Ω impedance. 7M

5. a) Draw Constructional features of DC Generator and explain each component in Generator. 7M

   b) Derive EMF equation of DC Generator and explain methods of excitation of DC Generators 7M

6. a) Draw and explain different speed-torque characteristics of shunt, series and compound Motors. 7M

   b) Explain speed control methods of DC Shunt motor. 7M

7. a) Explain constructional features of single phase transformer and draw its phasor diagram on No load. 7M

   b) Explain OC and SC test on single phase transformer. 7M

8. a) Briefly explain principle of operation of shaded pole motor. 7M

   b) Explain principle of operation of stepper motor with its characteristics. 7M

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Hall Ticket Number :										

R-11/R-13

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations May 2018

Mathematics – III

(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) Evaluate $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$. 7M

   b) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$. 7M

2. a) Prove that the function f(z) defined by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$ $(z \neq 0)$, $f(0) = 0$ is continous and the Cauchy's Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist. 7M

   b) Determine the analytic function, whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. 7M

3. a) Find all roots of the equation tanhz + 3 =0 7M

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

4. a) State and prove Cauchy's integral formula. 7M

   b) Evaluate $\int_c \frac{z^2 - z + 1}{z - 1}\, dz$, where c is the circle (i) |z|=2 (ii)|z|=1/2. 7M

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

   b) State and prove Laurent's theorem. 7M

6. a) Using Residue theorem, evaluate $\int_c \tan z\, dz$ where c is the circle $|z| = 2$. 7M

   b) Using Residue theorem, evaluate $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+1)(x^2+4)}$. 7M

7. a) State and prove Rouche's theorem. 7M

   b) Prove that the polynomial z^5+z^3+2z+3 has just one zero in the first quadrant of the complex plane. 7M

8. a) Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$. 7M

   b) Find the Bilinear transformation that maps the points (1,i,-1) into the points (2,i,-2). 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G341

II B.Tech. II Semester Supplementary Examinations May 2018

Signals and Systems

(Electronics & Communication Engineering)

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

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

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1. a) Discuss the concept of signal space and hence approximation of a function using complete set of orthogonal functions. 8M
   b) Describe Impulse function and Signum function 6M

2. a) Explain the concept of generalized Fourier series representation of signal f (t). 6M
   b) Explain Drichlet's conditions and properties of Fourier series. 8M

3. a) Explain how Fourier Transform is developed from Fourier series 8M
   b) Find the Fourier Transform of a periodic pulse train with period T=T/2 with amplitude 'A'. 6M

4. a) Differentiate between LTI and LTV systems with examples 5M
   b) Find whether the following systems are causal or non-causal
      i) y(t)=x(-t) **ii**) y(t) = x(t+10)+x(t) **iii**) y(t)=x(t)sin(t+1) 9M

5. a) With the help of neat sketches explain sampling theorem for Band limited signals. 7M
   b) Explain Natural and Flat top sampling & effects of under sampling. 7M

6. a) With the help of neat sketches explain sampling theorem for Band limited signals 8M
   b) The signal x(t)= cos5πt+0.3cos10πt is instantaneously sampled. Determine the maximum interval of the sample 6M

7. a) Find the Laplace transforms of the following functions
      i) Exponential Function **ii)** Unit step Function **iii)** Damped sign function 8M
   b) Find the Inverse Laplace transform of the functions
      1)$Y(s) = 10s/(s+2)^3(s+8)$ 2) $Y(s) = 2s^2+6s+6/(s+2)(s^2+2s+2)$ 6M

8. a) Find the Z-transform of the following
      x[n]=cosnw.u[n] **ii)** $x[n]=a^nu[n]$ 8M
   b) Derive relationship between z and Laplace Transform. 6M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G245

II B.Tech. II Semester Supplementary Examinations May 2018

Switching Theory and Logic Design

(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) Convert 2598.675_2 to Hexadecimal
   (b) Given that $16_{10} = 100_b$, Find the value of b.
   (c) Convert 10101111001.0111_2 to octal.
   (d) Express -45 in 8 bit 2's complement form.
   (e) Convert $4BAC_{16}$ to binary.
   (f) Convert the binary 1001 to the Gray code.
   (g) Encode data bits 1101 into 7 bit even parity hamming code. 14M

2. a) Simplify the following Boolean expressions to minimum number of literals
   i) x'y' + xy + x'y ii) x'z' + y'z' + yz' +xyz 7M

   b) i. What are Universal gates? Realize AND, OR, NOT, XOR gates using universal gates.
   ii. Reduce the expression f = (B + BC) (B + B'C) (B + D) 7M

3. Obtain the minimal expression for f = ∑ m (1, 2, 3, 5, 6, 7, 8, 9, 12, 13, 15) using Tabular Method. 14M

4. a) i) Draw the 4-bit look ahead carry adder with necessary expressions?
   ii) Design a 1 bit Magnitude comparator with logic gates? 7M

   b) i) Design a 4 bit Binary to Gray code converter?
   ii) Implement the following function using 8 : 1 MUX, F(x, y, z) = ∑m(0,2,3,5) 7M

5. a) Implement the following Boolean functions using PAL with four inputs and 3-wide AND-OR structure. i) F1(A, B, C, D) = ∑ m(2, 12, 13)
   ii) F2(A, B, C, D) = ∑ m(7, 8, 9, 10, 11, 12, 13, 14, 15)
   iii) F3(A, B, C, D) = ∑ m(0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15) 8M

   b) Draw the threshold gate. Explain the universality of Threshold gate. 6M

6. a) Convert J-K Flip-Flop to T Flip-Flop 6M

   b) Draw the 4 bit Ring Counter and Johnson Counter using D- Flip-flops and explain the difference between them state diagram. 8M

7. a) Draw the block diagram of a Finite State Model. Explain the capabilities and limitations of Finite State Machines. 4M

   b) For the below state table, find the equivalence partition and a corresponding reduced machine in standard form and also explain the procedure.

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

10M

8. a) Draw an ASM chart and state table for 2 bit up-down counter having mode control input.
   M = 1 up counting; M = 0 down counting
   The circuit should generate a output 1 whenever the count becomes minimum or maximum. 7M

   b) Draw the ASM chart for Binary multiplier and explain. 7M

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