Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations May/June 2022

Complex Variables & Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) To show that $\Gamma\left(\frac{1}{2}\right)=\sqrt{®}$ 7M

   b) To show that $\Gamma(n)=(n-1)\Gamma(n-1)$ 7M

OR

2. a) Show that $\Gamma(n)=\int_0^1\left(\log\frac{1}{x}\right)^{n-1}dx \ , n>0$ 7M

   b) Evaluate $\int_0^1\sqrt{\cot^{-}}d^{-}$ 7M

UNIT–II

3. a) Show that $f(z)=z+2\bar{z}$ is not analytic anywhere in the complex plane. 7M

   b) Determine whether the function $2xy+i\left(x^2-y^2\right)$ is analytic. 7M

OR

4. State and prove Cauchy-Riemann equation in Cartesian coordinates. 14M

UNIT–III

5. Evaluate $\int_c\frac{\log z}{(z-1)^3}dz$ where $c:|z-1|=\frac{1}{2}$ using Cauchy's integral formula 14M

OR

6. Integrate $f(z)=x^2+ixy$ from A(1,1) to B(2,8) along
   (i) The straight line AB (ii) The curve $c: x=t,\ y=t^3$ 14M

UNIT–IV

7. Find the poles of the function $\frac{z+1}{z^2(z-2)}$ and Residues at the poles 14M

OR

8. Evaluate $\oint_c\frac{4-3z}{z(z-1)(z-2)}dz$ where c is the circle $|z|=\frac{3}{2}$ using Residue theorem. 14M

UNIT–V

9. Under the Transformation $w=\frac{1}{z}$ find the image of the circle $|z-2i|=2$ 14M

OR

10. Determine the bilinear Transformation that maps the point $(1-2i,\ 2+i,\ 2+3i)$ into the points $(2+i,\ 1+3i,\ 4)$ 14M

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Hall Ticket Number :										

R-17

Code: 7G344

II B.Tech. II Semester Supplementary Examinations May / June 2022

Field Theory and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) Find the divergence and curl of vector field if $A=e^{xy}\, a_x + \sin xy\, a_y + \cos^2 xz\, a_z$ 7M
   b) Define Del operator ∇ or Del (function). Explain the different operations using Del operator. 7M

OR

2. a) Derive the expression for second Maxwell's equation and explain how electric field intensity (E) relates with Electric potential (V).. 7M
   b) Define Electric flux Density? Give the Relation between D & E? 7M

UNIT–II

3. a) Discuss about linear, isotropic, homogeneous mediums. 7M
   b) Define conductor ?And explain its properties with neat sketch 7M

OR

4. a) The capacitance of the conductor formed by the two parallel metal sheets each $100cm^2$, in area separated by a dielectric 2mm thick is $2x10^{-10}$ µf, a potential of 20KV is applied to it. find i) electric flux ii) potential gradient in kV/m iii) the relative permittivity of materials iv) Electric flux Density. 7M
   b) Derive the expression for a capacitance of coaxial capacitor with neat schematic. 7M

UNIT–III

5. a) Write a technical note on Faraday's law of Electro Magnetic induction? 7M
   b) Give the details about magnetic vector and scalar potential? 7M

OR

6. a) What will be the nature of force between the two current elements if the currents are in the same & opposite directions, explain with necessary derivations? 7M
   b) Discuss about transformer and motional emf's using Faraday's law. 7M

UNIT–IV

7. a) Analyze the plane waves in lossless dielectrics 7M
   b) Derive the wave equations for free space. 7M

OR

8. Derive equations for uniform plane waves in lossy dielectrics 14M

UNIT–V

9. a) Explain primary and secondary constants of transmission line with relevant expressions. 7M
   b) A generator of volt,1,000Hz,supplies power to 1,000Km,long open wire line terminated in Z_0(characteristics impedance) and having following parameters : R= 10.4ohm's., L=0.0037 henry,G=0.8microohms ,C=0.00835microfarad's. calculate Z_0 and P. 7M

OR

10. a) What is line distortion? Derive the condition for distortion less line? 7M
    b) Determine and Derive condition for minimum attenuation. 7M

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Hall Ticket Number :										

R-17

Code: 7G342

II B.Tech. II Semester Supplementary Examinations May/June 2022

Pulse and Digital Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) Draw the output waveform of a Low Pass RC circuit excited by step and pulse signals with different time constants 10M
   b) Show that how High Pass RC circuit acts as a differentiator 4M

OR

2. a) Derive the condition for perfect, over compensation of an Attenuator 10M
   b) Applications of Attenuators 4M

UNIT–II

3. a) Discuss various types clamping circuits with the help of waveforms 10M
   b) Applications of Clamper circuits 4M

OR

4. a) With neat sketches Explain the transistor switching times. 7M
   b) Draw the wave waveforms of (i) VBE (ii) Base current ib. (iii) collector current ic (iv) output voltage vo for a sinusoidal input signal of a transistor. 7M

UNIT–III

5. a) Define the following:
      i) Multivibrator ii)Stable State iii) Quasi stable state 6M
   b) Importance of Commutating capacitors in multivibrators with relevant circuit diagram 8M

OR

6. a) Draw the circuit diagram of Collector Coupled Astable Multivibrator and explain its operation with the help of wave forms at base and collector 7M
   b) Write the expression of pulse time in Monostable Multivibrator 7M

UNIT–IV

7. a) What is a time base signal? Explain the features of time base signal. 7M
   b) What are the methods of generating a time base waveform 7M

OR

8. a) Discuss the principle working of a Miller time base generator 7M
   b) Explain operation of transistor Bootstrap time base generator with neat diagram 7M

UNIT–V

9. a) Explain realization of two input OR gate by using RTL and DL 10M
   b) Compare logic gate with sampling gate 4M

OR

10. a) Explain realization of two input NAND gate by using DTL and RTL 10M
    b) Why NAND and NOR are universal gates explain 4M

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Hall Ticket Number :										

R-17

Code: 7G341

II B.Tech. II Semester Supplementary Examinations May/June 2022

Random Variables and Random Processes

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) State and Prove Total Probability Theorem 7M

   b) What is Probability density Function? List out the properties of probability density function with basic equations. 7M

OR

2. In certain college, 25% of the boys and 10% of the girls are studying Mathematics. The girls constitute 60% of the student body. If a student is selected at random and studying mathematics, determine the probability that the student is a girl. 14M

UNIT–II

3. a) Derive expressions for mean and variance for uniform random variable? 7M

   b) A discrete random variable X takes values from 1 to 5 with probabilities given below

X	1	2	3	4	5
P(X)	0.1	0.2	0.4	0.2	0.1

   Compute the variance and skew of the random variable X 7M

OR

4. a) Write about Chebychev's inequality and mention about its characteristic function 10M

   b) Explain the following terms: (i) Variance. (ii) Skew. 4M

UNIT–III

5. a) Define and State the properties of joint cumulative distribution function of two random variables X and Y. 7M

   b) Explain joint moments of two random variables. 7M

OR

6. a) Verify the properties of joint characteristic function. 7M

   b) If X is a random variable with mean 3 and variance 2, verify that the random Variables 'X' and Y= -6X+22 are orthogonal 7M

UNIT–IV

7. a) Discuss about Statistical independence with respect to random processes 7M

   b) A random process is given as X(t) = At, where A is a uniformly distributed random variable on (0,2). Find whether X(t) is wide sense stationary or not. 7M

OR

8. a) State and prove properties of cross correlation function 10M

   b) Brief out Correlation-ergodic Process 4M

UNIT–V

9. a) Prove the equation $S_{XY}(W) = S_{YX}(-W)$. 6M

   b) A wide sense stationary process X(t) has autocorrelation function $R_{XX}(\tau) = Ae^{-b|\tau|}$ where $b > 0$. Derive the power spectral density function 8M

OR

10. a) Derive the expression for average power of a random process x(t). 6M

    b) Obtain the average power in the random process $X(t) = A\cos(\omega_o t+\theta)$ where A, ω_o are real constants and θ is a random variable uniformly distributed in the range $(0, 2\pi)$. 8M

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