

Hall Ticket Number :

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R-17

Code: 7G344

II B.Tech. II Semester Supplementary Examinations November 2023

### 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 CO BL

#### UNIT-I

1. a) Summarize the advantages and applications of Gauss law? 7M CO1 L2  
b) Analyze the relation between E and V 7M CO1 L4

OR

2. Contrast following with expression.  
a) Coulomb's law. b) Gauss law. 14M CO1 L2

#### UNIT-II

3. Derive the capacitance in Parallel Plate Capacitors 14M CO2 L4

OR

4. a) Identify the convection and conduction currents 7M CO2 L1  
b) Explain the properties of materials and Dielectric Constant & strength 7M CO2 L2

#### UNIT-III

5. a) Explain the Forces due to Magnetic Fields 7M CO3 L2  
b) Elaborate magnetic flux density 7M CO3 L2

OR

6. a) Differentiate between electric and magnetic fields 7M CO3 L4  
b) List the applications of amperes law and explain any one of it 7M CO3 L1

#### UNIT-IV

7. Summarize waves in general with neat wave diagrams 14M CO4 L2

OR

8. With a neat diagram illustrate the concept of Poynting theorem and Poynting vector 14M CO4 L4

#### UNIT-V

9. Derive Condition for Distortion less ness and Minimum Attenuation 14M CO5 L3

OR

10. a) Discuss on Short Circuit (SC) and Open circuit (OC) Lines 7M CO5 L2  
b) Define Standing wave and how it produces in transmission lines 7M CO5 L2

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Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.

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<b>R-17</b>
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**Code: 7G342**

II B.Tech. II Semester Supplementary Examinations November 2023

**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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<b>UNIT-I</b>
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- 1. a) Derive the expression for the output of a Low pass circuit excited by exponential input for different time constants 10M
- b) Derive the expression for Rise time 4M

**OR**

- 2. a) Show that how High Pass RC circuit acts as a differentiator 4M
- b) Draw the output waveform of a High Pass RC circuit excited by square wave with different time constants 10M

<b>UNIT-II</b>
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- 3. a) Explain the operation of a two level diode clipper with the help of circuit diagram? 5M
- b) Discuss various types clamping circuits with the help of waveforms 9M

**OR**

- 4. a) Draw the Emitter coupled clipper circuit and explain its transfer characteristics 8M
- b) Discuss clamping circuit taking source and diode resistance into account 6M

<b>UNIT-III</b>
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- 5. Draw the circuit diagram of Fixed Bias Bistable Multivibrator and explain its operation with the help of wave forms at base and collector 14M

**OR**

- 6. a) Derive the expression for frequency of oscillations of an Astable Multivibrator 7M
- b) 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>UNIT-IV</b>
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- 7. a) What are the methods of generating a time base waveform 7M
- b) How is linearity corrected through adjustment of the driving waveform for a Current Time Base Generator 7M

**OR**

- 8. a) Distinguish the Miller and Bootstrap time base generators 5M
- b) Discuss the principle working of a Miller time base generator 9M

<b>UNIT-V</b>
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- 9. a) Discuss the advantages and disadvantages of Unidirectional sampling gate 5M
- b) Explain realization of two input OR gate by using RTL and DL 9M

**OR**

- 10. a) Explain the working of Bidirectional diode sampling gate with neat circuit diagram 10M
- b) What is pedestal? How its effect the output of a sampling gate? 4M

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<b>R-17</b>
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**Code: 7G341**

II B.Tech. II Semester Supplementary Examinations November 2023

**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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**UNIT-I**

1. a) Consider the experiment of tossing two dice simultaneously. If X denotes the sum of two faces, find the probability for  $X = 6$ . 7M
- b) Discuss the Independent and mutually exclusive events with an example each. 7M

**OR**

2. a) State and prove Bayes Theorem. 7M
- b) In a box there are 100 resistors whose resistances and tolerances are as shown in the table below. Let A be the event of drawing a 47  $\Omega$  resistor, B be the event of drawing a resistor with 5% tolerance, and C be the event of drawing a 100  $\Omega$  resistor. Find  $P(A/B)$ ,  $P(A/C)$  and  $P(B/C)$ . 7M

**UNIT-II**

3. a) Derive expressions for mean and variance for uniform random variable? 7M
- b) Find the Moment generating function of exponential distribution? 7M

**OR**

4. a) Obtain the characteristic function of Poisson random variable 8M
- b) Explain the following terms: (i) Variance. (ii) Skew. 6M

**UNIT-III**

5. a) Explain joint moments of two random variables. 7M
- b) Explain covariance of two random variables. 7M

**OR**

6. a) Verify the properties of joint characteristic function. 7M
- b) Two statistically independent random variables X and Y have mean values  $E[X] = 2$  and  $E[Y] = 4$ . They have second moments  $E[X^2] = 8$  and  $E[Y^2] = 25$ . Find Variance of  $W = 3X - Y$  7M

**UNIT-IV**

7. a) List and explain various properties of Autocorrelation function 7M
- b) If  $x(t)$  is a stationary random process having mean = 3 and auto correlation function:  $R_{XX}(\tau) = 9 + 2e^{-|\tau|}$ . Find the mean and variance of the random variable. 7M

**OR**

8. a) Discuss in detail about: (i) First order stationary random process. (ii) Ergodic process. 6M
- b)  $X(t) = 2A \cos(Wct + 2\theta)$  is a random Process, where ' $\theta$ ' is a uniform random variable, over  $(0, 2\pi)$ . Check the process for mean ergodicity 8M

**UNIT-V**

9. a) Discuss properties of cross power density spectrum 8M
- b) Derive the expression for average power of a random process  $x(t)$ . 6M

**OR**

10. a) Derive the expression for power density spectrum of a random process 8M
- b) Prove the equation  $S_{XY}(W) = S_{YX}(-W)$ . 6M

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**R-17**

**Code: 7GC43**

II B.Tech. II Semester Supplementary Examinations November 2023

**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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**UNIT-I**

1. a) Symmetry of Beta function  $B(m, n)=B(n, m)$  7M

b) Evaluate  $\int_0^1 \frac{x^2}{\sqrt{1-x^5}} dx$  in terms of B function 7M

**OR**

2. Prove that  $\int_0^{\frac{\pi}{2}} \sin^2 x \cos^4 x dx = \frac{\pi}{32}$  14M

**UNIT-II**

3. Determine P such that the function  $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1}\left(\frac{px}{y}\right)$  be an analytic function 14M

**OR**

4. Prove that  $z^n$  (n is a positive integer) is analytic and hence find its derivative. 14M

**UNIT-III**

5. Expand  $\text{Log } z$  by Taylor's series about  $z=1$ . 14M

**OR**

6. Evaluate  $\int_{(0,0)}^{(1,1)} (3x + 4xy + ix^2) dz$  along  $y = x^2$  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. Show that the function  $w = \frac{4}{z}$  transforms the straight line  $x=c$  in the z-plane into a circle in the w-plane. 14M

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