Hall Ticket Number :										

R-17

Code: 7G341

II B.Tech. II Semester Regular Examinations May 2019

Random Variables and Random Processes

(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) Write note on uniform and exponential random variable. 6M

   b) Consider a random variable X that takes discrete values, X={0,1,2,....n } for an event, {X ≤ x}. Compute the PDF for a binomial random variable with parameters(n, p) where n=4 and p=0.6 and find the following:

      i. P[1.5<X< 3]

      ii. P(0≤ X≤ 3)

      iii. P(1.2< X≤ 1.8) 8M

OR

2. a) What are conditional density functions? List properties of conditional density function. 7M

   b) Find the mean of an exponential distribution. 7M

UNIT–II

3. a) Discuss concepts of moment generation function and characteristic function of random variable. 8M

   b) Explain the concept of expectation of random variables. 6M

OR

4. a) Determine the mean value of following exponential function:

$$f_x(x) = \begin{cases} \frac{e^{-(x-a)/b}}{b} & x > a \\ 0 & x < a \end{cases}$$

   Then from that result calculate variance and skew of the same. 7M

   b) Write note on moments of random variable. Derive expression for variance and skew. Write note on Chebyshev's inequality. 7M

UNIT–III

5. a) Discuss on joint distribution function and its respective properties. 7M

   b) State joint density function and discuss the properties of joint density function 7M

OR

6. a) Compute the joint characteristic function of X and Y if

$$f_{xy} = \frac{1}{2\pi}\exp\left(\frac{-1}{2}(x^2 + y^2)\right)$$ 7M

   b) Show that the characteristic function and probability density function of a random variable forms a Fourier transform pair. State the central limit theorem 7M

UNIT–IV

7. a) Define ergodicity and explain time average, mean ergodic and Correlation ergodic random process. 7M

   b) List all the properties of auto-correlation and cross-correlation functions. 7M

OR

8. a) State some useful classifications of Random Processes. 7M

   b) Describe first order stationary random process and wide sense stationary random processes. 7M

UNIT–V

9. a) Derive expression for power density spectrum of a random variable. 7M

   b) A cross power density function is given below

$$\delta_{xy}(\omega) = a + jb\frac{\omega}{W} \quad ; -W < \omega < W$$

$$0 \quad ; \quad \text{Elsewhere}$$

   Find cross correlation function. 7M

OR

10. a) Derive relationship between cross power density spectrum and cross correlation function. 7M

    b) Find the power of the following random process, $x(t)=A_0\cos(\omega_0 t+\theta)$, where A0 , ω0 are constant and θ is uniformly distributed $(0,\pi/2)$. Also check, the stationarity of the process. 7M

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Hall Ticket Number :										

R-17

Code: 7G343

II B.Tech. II Semester Regular Examinations May 2019

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 carrier swing of a frequency-modulated signal is 70 KHz and the modulating signal is a 7 KHz sine wave. Determine the modulation index of the FM signal. 4M

   b) With the help of circuit diagram explain the operation of envelop detector for AM. 10M

OR

2. a) Sketch the circuit diagram of balanced modulator and explain how DSB-SC waveform is generated using any two methods. 7M

   b) Explain with sketch the phase discrimination method of SSB generation. 7M

UNIT–II

3. a) Explain the generation of Narrow band Frequency Modulation with suitable block diagram. 6M

   b) A 20 MHz carrier is frequency modulated by a sinusoidal signal such that the peak frequency deviation is 100 kHz. Determine the modulation index and the approximate bandwidth of the FM signal if the frequency of the modulating signal is: (i) 1 kHz (ii) 15 kHz. 8M

OR

4. a) Derive Carson's rule for the Bandwidth of an FM signal. 4M

   b) The equation for a FM wave is $s(t) = 10\sin [5.7 \times 10^8 t + 5 \sin 12 \times 10^3 t]$.
   Calculate: (i) Carrier frequency. (ii) Modulating frequency. (iii) Modulation index. (vi) Frequency deviation. (v) Power dissipated in 100 Ω. 10M

UNIT–III

5. a) Compare the noise performance of DSB-SC and SSB-SC. 7M

   b) Write note on Threshold effect in Angle Modulation System. 7M

OR

6. a) Write short note on Pre-Emphasis and De-Emphasis circuits. 7M

   b) Explain the noise performance of FM systems. 7M

UNIT–IV

7. a) Classify the radio transmitters based on type of modulation and service involved. 7M

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

OR

8. a) Discuss AGC and its principle of working in communication system. 7M

   b) Explain working of Variable reactance type FM Transmitter. 7M

UNIT–V

9. a) Discuss the necessity of multiplexing and Write short notes on FDM. 7M

   b) Compare PAM, PWM and PPM? 7M

OR

10. a) Explain the method of generation and detection of PAM signals with neat schematics. 7M

    b) Explain, how PPM signal is demodulated? What are its merits and demerits? 7M

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Regular Examinations May 2019

Complex Variables and Special Functions

(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 $\int_0^\infty e^{-ax}x^{m-1}\sin bx\,dx$ in terms of Gamma function 7M

   b) If $\tan(\theta+i\phi)=e^{i\alpha}$, then show that (i) $\theta=\left(n+\frac{1}{2}\right)\frac{\pi}{2}$

   (ii) $\phi=\frac{1}{2}\log\tan\left(\frac{\pi}{4}+\frac{\alpha}{2}\right)$ 7M

OR

2. a) Prove that $\int_0^1\frac{x^2dx}{\sqrt{1-x^4}}X\int_0^1\frac{dx}{\sqrt{1+x^4}}=\frac{\pi}{4\sqrt{2}}$. 7M

   b) Separate the real and imaginary parts of

   (i) $\sin(x+iy)$ (ii) $\cos(x+iy)$ (iii) $\tan(x+iy)$ 7M

UNIT–II

3. Derive Cauchy Riemann equations in cartesian coordinates 14M

OR

4. a) Find the analytic function whose real part is $\frac{\sin 2x}{\cosh 2y-\cos 2x}$. 7M

   b) If $f(z)$ is a regular function of z, prove that $\nabla^2|f(z)|^2=4|f'(z)|^2$. 7M

UNIT–III

5. a) Evaluate $\oint_C\frac{e^z}{\left(z^2+\pi^2\right)^2}dz$, where C is $|z|=4$. 7M

   b) Find the Laurent's series expansion of $f(z)=\frac{7z-2}{(z+1)z(z-2)}$ in the region $1<|z+1|<3$. 7M

OR

6. a) If $f(z)$ is analytic in the ring-shaped region R bounded by two concentric circles C and C_1 of radii r and $r_1\,(r>r_1)$ and with the centre at a, then for all z in R, prove that

   $f(z)=a_0+a_1(z-a)+a_2(z-a)^2+-----+a_{-1}(z-a)^{-1}+a_{-2}(z-a)^{-2}+----$

   where $a_n=\frac{1}{2\pi i}\oint\frac{f(t)}{(t-a)^{n+1}}dt$ 7M

   b) Expand $\sin z$ in a Taylor's series about $z=0$ and determine the region of convergence. 7M

UNIT–IV

7. a) By integrating around a unit circle, evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5-4\cos\theta} d\theta$ 7M

b) Evaluate $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2 (z-2)} dz$, where C is the circle $|z| = 3$ 7M

OR

8. Evaluate $\int_{-\infty}^{\infty} \frac{e^{ax}}{e^x + 1} dx$ 14M

UNIT–V

9. a) Show that $w = \frac{i-z}{i+z}$ 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 1, i, -1 to 2, i, -2 respectively. Find the fixed and critical points of the transformation. 7M

OR

10. a) Discuss the transformation $w = e^z$. 7M

b) Prove that the transformation $w = \sin z$, maps the families of lines x = constant and y = constant into two families of confocal central conics. 7M

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Hall Ticket Number :										

R-17

Code: 7GA41

II B.Tech. II Semester Regular Examinations May 2019

Managerial Economics and Financial Analysis

(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. Define managerial economics. Also explain how it helps in solving managerial problems? 14M

OR

2. What are the various determinants of demand? Explain each of them in detail. 14M

UNIT–II

3. What do you mean by laws of returns? Explain with suitable examples 14M

OR

4. a) A firm has fixed cost of Rs.8,000, it's selling price per unit is Rs.5 and variable cost per unit is Rs.3 Calculate BEP in terms of output and sales. 7M

   b) Determine the margin of safety, assuming the actual production as 5,000 units. 7M

UNIT–III

5. Explain how the price is determined under perfect competition. 14M

OR

6. What are the factors that affect the choice of form of business organization? Explain. 14M

UNIT–IV

7. Write a short note on

   a) Equity shares 7M

   b) Debentures 7M

OR

8. Explain about net present value method. 14M

UNIT–V

9. The following balances are extracted from the books of Ramana on 31-12-2015. Prepare final accounts.

Particulars	Rs.	Particulars	Rs.
Ramana drawings	5,000	Ramana's capital	30,000
Furniture and fittings	2,600	Bank overdraft	4,327
Business premises	20,000	Creditors	7,345
Stock(01-01-2015)	33,117	Returns onwards	1,326
Sundry debtors	17,300	Rents from tenants	320
Purchases	1,00,000	Sales	1,39,204
Return inwards	1,905		
Discount	1,600		
Taxes and insurance	1,000		
	1,82,522		1,82,522

Adjustments:

1. Stock at end is Rs.20,904
2. 4%depreciation allowed on premises, furniture and fittings
3. Allow interest on capital at 5%
4. Carry forward unexpired insurance Rs.200.
5. Make a reserve of 5% on sundry debtors. 14M

OR

10. What are the advantages and disadvantages of ratio analysis? Explain. 14M

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Hall Ticket Number :										

Code: 7G342

R-17

II B.Tech. II Semester Regular Examinations May 2019

Pulse and Digital Circuits

(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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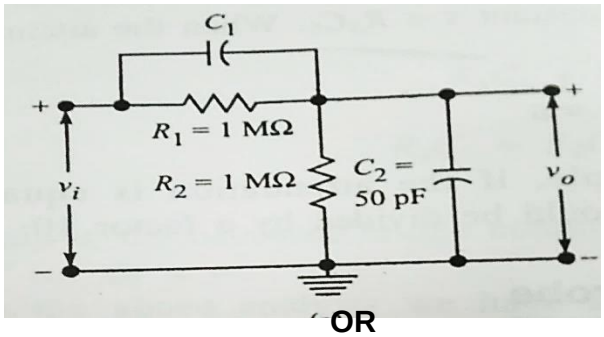
UNIT–I

1. a) Explain attenuator under perfect compensation, over compensation and under compensation with suitable diagrams. 6M

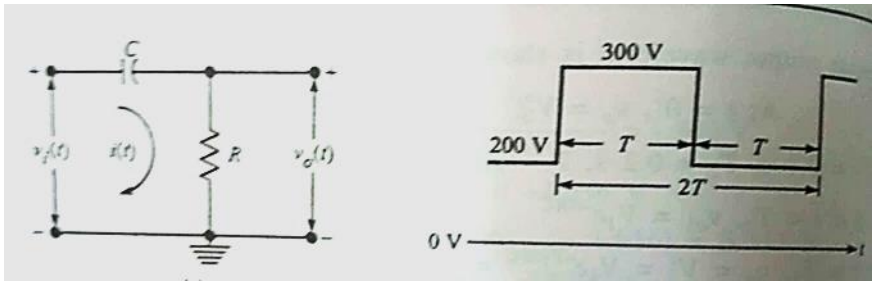
   b) Compute and draw to scale the output waveform for a) C_1 = 50 pF b) C_1 = 75pF, and c) C_1 = 25 pF respectively for the circuit shown for a input of 20V step.



8M

OR

2. a) The square wave shown in figure is fed to an RC coupling network. What are the output voltage wave forms if a) RC =10T b) RC = T/10



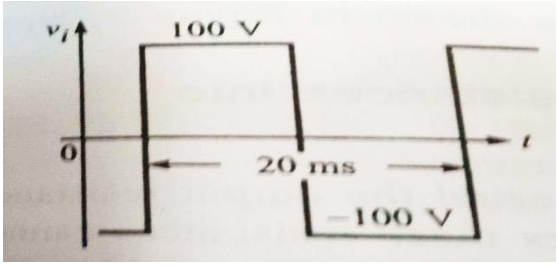
8M

   b) A 1kHz symmetrical square wave of ± 10V is applied to an RC circuit having 1ms time constant. Calculate and plot the output for the RC configurations as a) high-pass circuit and b) Low-pass circuit 6M

UNIT–II

3. a) Explain the clamping circuit considering the source resistance and the diode forward resistance. 6M

   b) A 100V peak square wave with a period of 20ms shown in figure. Is to be negatively clamped at 25V. Draw the circuit diagram necessary for this purpose. Draw the output waveform.

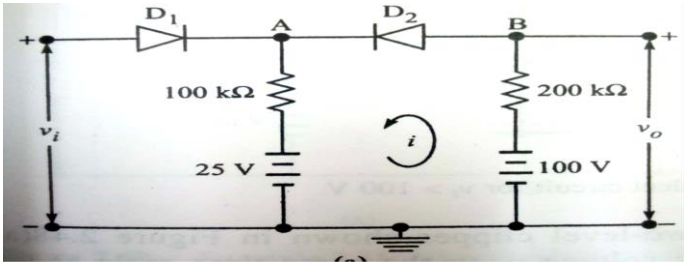


8M

OR

4. a) Explain series and shunt clippers with and without reference voltage and also explain clipping at two independent levels with help of transfer characteristics. 6M

   b) The input voltage Vi to the two-level clipper shown varies linearly from 0 to 150V. Sketch the output voltage Vo to the same time scale as the input voltage. Assume ideal diodes.



8M

UNIT–III

5. a) With neat circuit diagram, Explain the working of fixed bias bistable multi vibrator. 6M

   b) Design and draw a collector-coupled ONE-SHOT using silicon npn transistors with h_{FE}(min) =20. In stable state, the transistor in cut-off has V_{BE} = -1V and the transistor in saturation has base current, I_B which is 50% excess of the I_B(min) value. Assume V_{CC} = 8V, I_C(sat) =2mA, delay time = 2.5ms & $R_1 = R_2$. Find R_C, R, R_1, C and V_{BB} . 8M

OR

6. a) Design a collector-coupled Monostable multivibrator using an n-p-n silicon transistor with h_{FE}(min) = 40, V_{BE} (cut off) ≈ 0 V and I_B(sat) = 1.5 I_B (min). Given that: V_{CC} = 10 V, I_C (sat) = 5 mA, $R_{C1} = R_{C2} = R_C$, V_{CE} (sat) = 0.2 V and V_{BE}(sat) = 0.7 V. If the pulse width required is 1 ms, calculate the value of C. 8M

   b) Design a Schmitt trigger circuit using npn silicon transistors with V_{BE} = 0.7V, V_{CE} (sat) = 0.2V, h_{fe}(min) = 60 and I_C(ON) = 3mA to meet the following specifications: V_{CC} =12V, upper threshold voltage, V_{UT} = 4V, lower threshold voltage, V_{LT} =2V. 6M

UNIT–IV

7. a) List out the various methods to generate a time base waveform 6M

   b) The specifications of UJT are given as η =0.6, V_v = 2 V, R_{BB} = 5 kΩ, I_v = 1.5 mA, I_P = 8 μA and V_{BB} = 18 V. Calculate the component values of the UJT sweep circuit to generate an output sweep frequency of 10 kHz with sweep amplitude of 12 V. 8M

OR

8. a) Explain the basic principles of Miller and Bootstrap time base generators. 6M

   b) Discuss about Transistor Current Time Base Generator 8M

UNIT–V

9. a) Explain how the loading of the control signal is reduced when the number of Inputs increases in a sampling gate. 8M

   b) Explain, how Monostable multivibrator can be used for frequency division? 6M

OR

10. a) Explain the function of a sampling gate used in Sampling Scopes also explain how sampling gate is used in chopping amplifiers. 8M

    b) How to cancel the pedestal in a sampling gate? Discuss with suitable circuit diagram. 6M

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Hall Ticket Number :										

R-17

Code: 7G344

II B.Tech. II Semester Regular Examinations May 2019

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 divergence theorem 7M

   b) A square plate described by $-2 \leq x \leq 2, -2 \leq y \leq 2, z = 0$ carries a charge 12 mC/m^2. Find the total charge on the plate and the electric field intensity at $(0, 0, 10)$. 7M

OR

2. a) Determine the electric flux density due to uniformly charged sphere by using Gauss's law and draw the variation of **D** with radius. 7M

   b) A point charge of 5 nC is located at the origin. If $V = 2\ V$ at $(0, 6, -8)$, find

      (i) The potential at $A(-3, 2, 6)$

      (ii) The potential at $B(1, 5, 7)$

      (iii) The potential difference V_{AB} 7M

UNIT–II

3. a) Define the following terms

      (i) Isotropic dielectric

      (ii) Homogeneous dielectric

      (iii) Dielectric constant 6M

   b) Derive the capacitance of coaxial cable having the inner conductor radius 'a' and outer conductor radius 'b'. 8M

OR

4. a) Discuss about convection current and conduction current 6M

   b) Derive the capacitance of parallel plate capacitor and then prove that the energy stored in parallel plate capacitor is $\frac{1}{2}CV^2$ 8M

UNIT–III

5. a) Find out the magnetic field intensity due to infinite sheet charge using Ampere's Circuit law. 8M

   b) Planes $z = 0\ and\ z = 4$ carry current $K = -10a_x\ A/m\ \ and\ K\ = 10a_x\ A/m,$ respectively. Determine **H** at

      (i) (1, 1, 1)

      (ii) (0, -3, 10) 6M

OR

6. a) Derive magnetic scalar and vector potentials 8M

   b) State and explain Faraday's law 6M

UNIT–IV

7. a) State and prove Poynting theorem 6M

   b) In a nonmagnetic medium

$$E = 4\ \sin(2\pi \times 10^7 t - 0.8x)a_z \text{ V/m}$$

   Find

   (i) ε_r, η

   (ii) The time average power carried by the wave

   (iii) The total power crossing 100 cm^2 of plane 2x + y = 5. 8M

OR

8. a) Derive the reflection coefficient and transmission coefficient when the EM wave incident on perfect dielectric with normal incidence. 7M

   b) In free space $(z \leq 0)$, a plane wave with

$$H_i = 10\ \cos(10^8 t - \beta z)a_x\ mA/m$$

   Is incident normally on a lossless medium $(\varepsilon = 2\varepsilon_0, \mu = 8\mu_0)$ in region $z \geq 0$. Determine the reflected wave $\mathbf{H_r}$, $\mathbf{E_r}$ and the transmitted wave $\mathbf{H_t}$, $\mathbf{E_t}$. 7M

UNIT–V

9. a) Define and derive the relation between reflection coefficient and standing wave ratio of a transmission line. 6M

   b) A lossless transmission line with $Z_0 = 50\ \Omega$ is 30 m long and operates at 2 MHz. The line is terminated with a load $Z_L = 60 + j40\ \Omega$. If $u = 0.6c$ on the line, find

   (i) The reflection coefficient

   (ii) The standing wave ratio

   (iii) The input impedance 8M

OR

10. a) Discuss about smith chart and its applications 7M

   b) Differentiate between lossless transmission line and distortion less transmission line and obtain the condition for distortion less line. 7M

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