Hall Ticket Number :										

R-15

Code: 5G246

II B.Tech. II Semester Supplementary Examinations October 2020

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. Explain about Impedance and Admittance Parameters in detail with example and draw equivalent circuits. 14M

OR

2. a) Explain in detail about the ABCD parameters with example. 7M

   b) Obtain the expression of Z parameters in terms of Y parameters. 7M

UNIT–II

3. a) Explain in detail about the transients in R-C series circuit with DC Excitation? 7M

   b) A circuit of resistance 10 ohms and the inductance of 0.1 H in series has a direct voltage of 200 V suddenly applied to it. Find the voltage drop across inductance at the instant of switching on and at 0.01 second? 7M

OR

4. Obtain the DC response of Series RLC Circuit. 14M

UNIT–III

5. a) Define filter and write short notes on low-pass filter? 7M

   b) Discuss about constant k low pass and high pass filters. 7M

OR

6. a) Derive the design equations for Lattice type attenuator? 6M

   b) What is attenuator? Design a T-section symmetrical attenuator to provide a voltage attenuation of 15 dB and having a characteristic impedance of 500 Ω? 8M

UNIT–IV

7. a) Explain about three point starter. 8M

   b) Discuss torque equation of dc motor. 6M

OR

8. a) Write the applications of different types of DC motors? 4M

   b) Draw and explain magnetization and load characteristics of DC shunt generator? 10M

UNIT–V

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

   b) Discuss stepper motor and its characteristics. 7M

OR

10. a) What is the need of a transformer? 5M

    b) Explain the Constructional details of transformer with necessary figures. 9M

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Hall Ticket Number :										

R-15

Code: 5G344

II B.Tech. II Semester Supplementary Examinations October 2020

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) Compute the expression for electricfield due to line charge distributions? 7M

   b) Point charges 5nC and -2nC are located at (2, 0, 4) and (-3, 0, 5) ,respectively .

      i) Determine the force on a 1nC point charge located at (1, -3, 7).

      ii) Find the electric field E at (1, -3, 7) 7M

OR

2. a) State and prove Gauss's law .Express Gauss's law in both integral and differential forms. and also discuss the salient features and limitations of Gauss's law 7M

   b) Obtain the expression for the field and the potential due to a small electric dipole oriented along 7M

UNIT–II

3. a) Derive the equation for Continuity equation and relaxation time 7M

   b) A parallel plate capacitor with free space between the plates is connected to a constant source an voltage .Determine how electro static energy wE, capacitance C, total charge Q and surface charge density $\rho_{s\ change}$ as dielectric of ϵ_r=2 is inserted between the plates. 7M

OR

4. a) Derive an equation of polarization 'p' in dielectric materials 7M

   b) Derive Poisson's and Laplace's equations starting from Gauss's law 7M

UNIT–III

5. a) State and derive Biot-Savart's law? Is Magnetostatic field conservative discuss, hence obtain M.E for divergence of magnetic field? 10M

   b) A current element of length 2 cm is located at the origin in free space and carries current 12mA along a_z, a filamentary current of 15 a_z, is located along x=3, y=4. Find the force on a current filament? 4M

OR

6. a) What is magnetic energy? Derive energy stored in Magnetostatic field? 8M

   b) Given the magnetic vecto[y? Deri]tial V_{vm}= $(-\rho^2/4)a_z$ wb/m^2 ? Calculate the total magnetic flux crossing the surface [or poter] $\Phi=\varpi/2$, 1<ρ<2m, 0<z<5m? 6M

UNIT–IV

7. a) For conducting medium derive expressions for ὰ and β? 7M

   b) State and prove pointing theorem. 7M

OR

8. a) Derive expression for reflection and transmission coefficients of an EM wave when it is incident normally on a dielectric. 7M

   b) Distinguish between good conductors and good dielectrics. explain the wave propagation in good dielectrics 7M

UNIT–V

9. a) Explain how quarter wave transformer is used for load matching and impedance measurement of a transmission line? 8M

   b) An open wire transmission line having characteristic impedance 600Ω is terminated by a resistive load of 900Ω. Design single stub matched transmission line. 6M

OR

10. a) Why stub matching is used? Explain the double stub matching for transmission lines 7M

    b) Explain Smith chart and its applications? 7M

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Hall Ticket Number :										

R-15

Code: 5G342

II B.Tech. II Semester Supplementary Examinations October 2020

Pulse and Digital Circuits

(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) Explain the operation of RC low pass circuit for a square wave input
   b) A 10Hz symmetrical square wave whose peak-to-peak amplitude is 2V is impressed upon a High pass circuit whose lower 3-dB frequency is 5Hz. Calculate and sketch the output wave form. In particular, what is peak-to-peak output amplitude?

OR

2. a) Explain the pulse response of an RC High pass circuit.
   b) What is the attenuator? Explain it with neat sketch.

UNIT–II

3. a) Discuss in detail about diode switching times
   b) Explain how transistor acts as a switch with relevant diagrams.

OR

4. a) State and prove clamping circuit theorem.
   b) Illustrate the operation of two-level diode clipper with appropriate expressions.

UNIT–III

5. a) Explain the basic principles of Miller and Bootstrap time base generators?
   b) Explain the principle of Synchronization and frequency division in blocking Oscillator?

OR

6. a) Draw and explain Sweep circuit using UJT?
   b) Derive the expression for slope error and sweep speed for the Bootstrap Sweep circuit?

UNIT–IV

7. a) Classify the different methods of generating a time base waveform? Explain them briefly.
   b) Describe the operation of Bootstrap time generator using transistors with neat sketch.

OR

8. a) Discuss about the simple Current sweep circuit
   b) Explain about the linearity correction through adjusting of driving waveform

UNIT–V

9. a) Draw the circuit of bidirectional sampling gate using diodes. Derive the expression for gain.
   b) What do you mean by pedestal? How pedestal can be reduced in sampling gate.

OR

10. a) Realize two inputs TTL NAND gate truth table and explain its operation with suitable circuit diagram.
    b) Examine the operation of OR & AND logic gates with diodes using truth table.

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Hall Ticket Number :										

R-15

Code: 5G341

II B.Tech. II Semester Supplementary Examinations October 2020

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) Define Total Probability and Bayes theorem with necessary derivations 7M

   b) An experiment consists of observing the sum of the numbers showing up when two dice are thrown. If only three events are of interest represented by A= {sum=7}, B = {8<sum<=7} and C= {10<sum}. Calculate the probabilities of the events by developing the model for the given experiment. 7M

OR

2. Distinguish Distribution and Density functions with their properties and required equations. 14M

UNIT–II

3. a) A random X is uniformly distributed on the interval (-5,15). Another random variable Y= $e^{-x/5}$ is formed. Find E[Y]. 7M

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

OR

4. a) Explain the concept of transformation of random variable X. 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. State and Prove Central Limit Theorem for equal distributions 14M

OR

6. a) Formulate Distribution and Density functions for a sum of two Statistically Independent Random variables 7M

   b) Let $g(x,y) = b\, e^{-x} \sin y$ for $0 \le x \le 2$, $0 \le y \le \pi/2$, Find constant value 'b' if given function is a valid density function. 7M

UNIT–IV

7. a) State and prove the properties of auto-correlation function. 7M

   b) Classify Random processes with neat sketches 7M

OR

8. a) Explain the concept of Wide Sense Stationary random processes. 7M

   b) What is mean ergodic and correlation ergodic random processes. Explain? 7M

UNIT–V

9. a) Discuss about the bandwidth of Power Density Spectrum 7M

   b) Define Power Spectrum and explain its properties. 7M

OR

10. a) Derive relationship between Power Spectrum and auto-Correlation function 7M

    b) Define cross power density spectrum. 7M

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Hall Ticket Number :										

R-15

Code: 5G343

II B.Tech. II Semester Supplementary Examinations October 2020

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) A broadcast AM transmitter radiates 50KW of carrier power. What will be the radiated power at 80% modulation? 7M

   b) Draw the block diagram and explain the generation of SSB-SC wave using phase shift methods. 7M

OR

2. a) Consider the AM signal S_{AM} (t) = [A_c + m(t)]COS 5000t, where the modulating signal is given by m(t) = 3 cos 50 t + 5 cos 150 t. Let the modulation index be 0.8. Find i) The amplitude of the carrier ii) carrier power & iii) transmission efficiency. 8M

   b) What is the necessity of synchronous Carrier in the coherent detection of a Suppressed carrier signal? Explain in detail, with the necessary mathematical treatment. 6M

UNIT–II

3. a) Briefly Explain about Wide band frequency modulation 7M

   b) The FM signal has a sinusoidal modulation frequency 15Khz and a modulation index β=2 using carson rule. Find the transmission bandwidth 7M

OR

4. a) Draw the block diagram of Armstrong method of generating a wideband FM signal and explain its working principle. 7M

   b) Explain balanced slope-detector for detecting FM signal 7M

UNIT–III

5. a) Derive an expression for output SNR for DSB-SC system 7M

   b) With the necessary equations derive SNR to SSB-SC System 7M

OR

6. a) Explain threshold effect in Angle modulation 7M

   b) Explain the purpose of pre emphasis and de-emphasis circuits and the working of these circuits 7M

UNIT–IV

7. a) Draw the block diagram of AM transmitter using low level modulation and explain the significance of each block. 8M

   b) What is an Amplitude Limiter? Explain its operation with a neat circuit Diagram. 6M

OR

8. Classify Radio transmitters according to the type of modulation, service involved and frequency range involved. 14M

UNIT–V

9. a) Explain the generation and detection of PWM signals with neat diagram. 8M

   b) Explain Time division multiplexing scheme. 6M

OR

10. a) Explain the generation and demodulation of a PAM signal with neat circuit diagram. 6M

    b) Explain the generation and demodulation of a PPM signal. 8M

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Hall Ticket Number :										

R-15

Code: 5GC41

II B.Tech. II Semester Supplementary Examinations October 2020

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 $\int_0^1 x^2\left(\log\frac{1}{x}\right)^3 dx$

   b) If sin(A + iB)=x+iy, prove that (i) $\frac{x^2}{\cosh^2 B}+\frac{y^2}{\sinh^2 B}=1, (ii)\frac{x^2}{\sin^2 A}-\frac{y^2}{\cos^2 A}=1$

OR

2. a) Show that $\int_0^{\frac{\pi}{2}} \sin^2\theta\ \cos^4\theta\, d\theta = \frac{\pi}{32}$

   b) Separate into real and imaginary parts for f(z) = tanz

UNIT–II

3. Prove that the function f(z) defined by $f(z)=\begin{cases}\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & z\neq 0\\ 0, & z=0\end{cases}$ is continuous and the C – R equations are satisfied at the origin. Yet $f^1(0)$ does not exist.

OR

4. Find the analytic f(z) = u + iv, if u – v = $\frac{\cos x+\sin x-e^{-y}}{2\cos x-e^{y}-e^{-y}}$ and f(π/2) = 0

UNIT–III

5. a) State and prove Cauchy's theorem.

   b) Find the Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point $z=i$.

OR

6. a) If $f(z)$ is analytic inside a circle C with centre at a, then for z inside C prove that

$$f(z)=f(a)+f'(a)(z-a)+\frac{f''(a)}{2!}(z-a)^2+-----+\frac{f^n(a)}{n!}(z-a)^n+----$$

   b) Derive Cauchy's integral formula.

UNIT–IV

7. a) Determine the poles of the function $\frac{z^2+1}{z^2-2z}$ and the residue at each pole

   b) Use Rouche's theorem to show that the equation $z^5+15z+1=0$ has one root in the disc $|z|<\frac{3}{2}$ and four roots in the annulus $\frac{3}{2}<|z|<2$.

OR

8. a) Evaluate $\int_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle $(i)|z|=1,\ (ii)|z+1-i|=2$

   b) state and prove Argument Principle

UNIT–V

9. Find the bilinear transformation which maps the points z = 1, i, -1 onto the points w = i, 0, -i. Hence find (a) the image of $|z|<1$,

OR

10. Show that the transformation effected by an analytic function $w=f(z)$ is conformal at every point of the Z-plane where $f'(z)\neq 0$.

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