Hall Ticket Number :										

R-15

Code: 5G343

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

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) Describe AM wave by considering single modulating signal. Draw its time and frequency domain representation. 7M

   b) What is the effect of phase and frequency error in demodulation of SSB wave using synchronous detector. Explain in detail. 7M

OR

2. a) Explain the generation of DSBSC wave using balanced modulator 6M

   b) Derive the canonical expression for Vestigial Side Band (VSB) wave. How it is used in TV broadcast? 8M

UNIT–II

3. a) What is a PLL? Assuming the linear model, explain with expressions, how PLL can be used as FM detector. 6M

   b) Explain the working of a balanced frequency discriminator with the help of circuit diagram. 8M

OR

4. a) Explain in detail about NBFM and WBFM. Derive the expression for bandwidth of wideband FM. 9M

   b) A single tone FM signal is given by $V(t) = 10\sin(16® \times 10^6 t) + 20\sin(2® \times 10^3 t)$ volts. Determine the modulation index, modulating frequency, frequency deviation, carrier frequency and the power of the FM signal. 5M

UNIT–III

5. a) Discuss the noise performance of AM system using envelop detection? 8M

   b) What is FM threshold effect? How to achieve threshold reduction in FM system? 6M

OR

6. a) What is the need of pre-emphasis and de-emphasis in FM transmission? Sketch their frequency response. How are these of avail in FM systems? 7M

   b) Define Figure of Merit (FoM). Derive the expression for FoM of SSB-SC system. 7M

UNIT–IV

7. a) Draw the block diagram of a super heterodyne receiver and explain its operation? What are the advantages of this receiver? 7M

   b) What are image frequency and its rejection? In a broadcast super heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the IF frequency is 455kHz, determine the image frequency and its rejection ratio for tuning at (a) 1.1kHz & (b) 25kHz. 7M

OR

8. a) What is simple Automatic Gain Control (AGC)? What are its functions? What is delayed AGC and what are its merits compared to simple AGC? 8M

   b) Discuss the considerations in the choice of IF and the design of IF stage. 6M

UNIT–V

9. a) Explain the concept of TDM and FDM clearly. 10M

   b) Compare TDM and FDM. 4M

OR

10. a) Compare PAM, PWM and PPM. 4M

    b) Explain how PPM and PWM signals are generated from PAM signals. Also, explain how they are detected. 10M

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Hall Ticket Number :										

Code: 5GC41

R-15

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Complex Variables & Special Functions

(Common to EEE and 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 $\int_0^1 \left(\log\frac{1}{y}\right)^{n-1} dy,\ (n>0)$. 6M

   b) Separate $\int_0^1 \left(\log\frac{1}{y}\right)^{n-1} dy$, into real and imaginary parts. 8M

OR

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

   b) If $\tan^{-1}(x+iy) = e^{i\alpha}$, show that $\theta = (n+\frac{1}{2})\frac{\pi}{2}$ and $\varphi = \frac{1}{2}\{\log\tan(\frac{\pi}{4}+\frac{\alpha}{2})\}$ 7M

UNIT–II

3. a) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though CR equations are satisfied there. 7M

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

OR

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

   b) Show that the function $u = \frac{1}{2}\log(x^2+y^2)$ is harmonic. 7M

UNIT–III

5. a) Evaluate $\int_{-2+i}^{2+i} (z^2)\,dz$, along the line $y = 2$ 7M

   b) Using Cauchy's integral formula, evaluate $\oint_C \frac{\sin\pi z^2 + \cos\pi z^2}{(z-1)(z-2)}dz$, where C is the circle $|z| = 3$ 7M

OR

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

   b) Find the Laurents series expansion of $\frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$ 7M

UNIT–IV

7. a) Find the residues of $f(z) = \frac{z^3}{(z-1)^4(z-1)(z-3)}$ at its poles. 7M

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

OR

8. a) State and prove Argument principle. 7M

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

UNIT–V

9. a) Find the bilinear transformation which maps the points $z = 1, i, -1$ onto $w = i, 0, -i$ 7M

   b) Discuss the transformation $f(z) = z^2$ maps the families of lines $x = \text{constant}$ and $y = \text{constant}$ into two families of confocal central conics. 7M

OR

10. a) Discuss the transformation $w = \cosh z$ 7M

    b) Find the bilinear transformation which maps the points $z = 0, i, \infty$ onto $w = 1, -i, -1$ 7M

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Hall Ticket Number :										

R-15

Code: 5G246

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

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. a) Define and obtain transmission parameters by taking any one example? 8M
   b) The Z-parameters of a two-port network are Z_{11}=10 Ω, Z_{22}=20 Ω, Z_{12}=Z_{21}=5Ω. Find the ABCD parameters. 6M

OR

2. a) What is the use of *h*-parameters? Derive equations to determine these parameters. State the condition for symmetry and Reciprocity in a two port network in terms of "h" parameters. 10M
   b) Obtain "Z" parameters in terms of "Y" parameters for a two port network. 4M

UNIT–II

3. a) What are the different types of transients? 4M
   b) A 20 ohm resistor, a 0.01 h inductor and a 100 μF capacitor are connected in series. A d.c. voltage of 100 V is suddenly applied to the circuit. Obtain the equation showing how the current through the circuit is varies with time. Find the maximum current and the time at which it occurs? 10M

OR

4. a) Explain in detail about the transients in R-C series circuit with DC Excitation? 8M
   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? 6M

UNIT–III

5. a) Define filter and write short notes on low-pass filter? 6M
   b) A filter is required to pass all frequencies above 25 kHz and to have a nominal impedance of 600 Ω. Design (i) a high-pass T section filter and (ii) a high-pass π- section filter to meet these requirements? 8M

OR

6. a) 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? 6M
   b) Derive the design equations for Lattice type attenuator? 8M

UNIT–IV

7. a) Derive the EMF Equation of a DC Generator? 4M
   b) Explain how the speed of a DC shunt motor is controlled through flux and armature control method? 10M

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 OC and SC tests of a 1-phase transformer with a neat circuit diagram? 10M
   b) A 11000/400 V distribution transformer takes a no load primary current of 1 A at a power factor of 0.24 lagging. Find: (i) Core loss current. (ii) Magnetizing current. (iii) Iron loss. 4M

OR

10. a) Explain the construction of hybrid stepper motor with diagram? 10M
    b) Write the advantages of capacitor start and run single phase induction 4M

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Hall Ticket Number :										

R-15

Code: 5G344

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

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 Explain Coulomb's law using vector form of coulomb's force expression. 7M

   b) Let J= 400 $\sin\theta/(r^2+4)$ $\mathbf{a_r}$ A/m^2. Find the total current flowing through that portion of the spherical surface r=0.8 bounded by $0.1\pi<\theta<0.3\ \pi$, $0<\varphi<2\ \pi$ 7M

OR

2. a) State and prove Gauss law for arbitrary shaped closed body. 7M

   b) A potential field is given as $V=100e^{-5x}$ sin3y cos4z Volts. Let the point P(0.1,pi/12, pi/24) be located at a conductor free space boundary. At point P, find i) **E** ii) **D** iii) ρ_s 7M

UNIT–II

3. a) A conductor is called as "Equipotential Body". State yes or no. and Justify the statement with the necessary mathematical equations. 6M

   b) If J = $(1/r^3)$. (2 cos θ $\mathbf{a_r}$ + sin θ $\mathbf{a_\varphi}$) A/m^2, calculate the current passing through a

   i) Spherical shell of radius of 10 cm

   ii) Hemispherical shell of radius of 20 cm 8M

OR

4. a) A circular disc of 10 cm is charged uniformly with a total charge of 10 Coulombs. Find Electric field intensity at a point 20 cm away from the disc along the axis. 7M

   b) Distinguish between the conduction and convection currents. Calculate the relaxation time for Brass material, having conductivity of $1.1x10^7$ mho/m at 10 MHz. 7M

UNIT–III

5. 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) Establish the fields in the different regions of coaxial carrying a current I, and sketch their variation with radial distance. 7M

OR

6. a) What is the force experienced by a charge in a magnetic field? Obtain Lorents force equation. 7M

   b) Write a short note on Inductances 7M

UNIT–IV

7. a) Derive the relations between E & H in a uniform plane wave. Find the value of intrinsic impedance of free space. 8M

   b) Derive the expression for attenuation and phase constants of uniform plane wave in a good dielectric 6M

OR

8. a) Derive the expressions for reflection and transmission coefficients, when a uniform plane wave incidents normally on surface of a perfect dielectric 8M

   b) A uniform plane wave is incident normally on a infinitely thick slab of material with 25 V/m electric field. The material has a dielectric constant 4. How much power penetrates the material slab? 6M

UNIT–V

9. a) Derive the expression for the transmission line equation 6M

   b) A lossless transmission line having $Z0=120\pi\Omega$ is operating at ω=5x108 rad/s. If the velocity on the line is 2.4x108 m/s find L & C. Let ZL be represented by an inductance of 0.6μH in series with a 100 Ω resistance. Find reflection coefficient and VSWR. 8M

OR

10. a) Derive the characteristic impedance of the transmission line in terms of its line constants 7M

    b) Explain how to find the length and the distance of double stub in transmission line matching 7M

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Hall Ticket Number :										

Code: 5G342

R-15

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

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) Derive the expression for the output of a high-pass circuit excited by exponential input and ramp for different time constants. 8M

   b) A 20 Hz symmetrical square wave whose peak to peak amplitude is 1V is impressed upon a high –pass RC circuit whose lower 3-dB frequency is 10Hz. Calculate and sketch the output waveform for the first two cycles. What is the peak-to-peak output amplitude under steady-state conditions? 6M

OR

2. a) Define following
   - i. Transmission Error
   - ii. Percentage tilt
   - iii. Attenuator.
   - iv. Over compensation
   - v. Linear wave shaping
   - vi. integrator

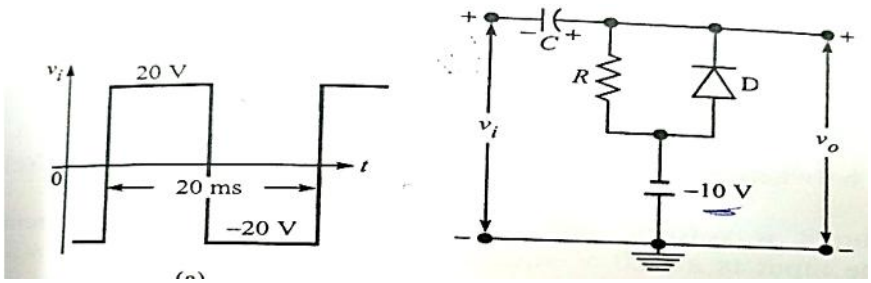
   6M

   b) A square wave whose peak-to-peak value is 1V extends ± 0.5V with respect to ground. The duration of the positive section is 0.1 sec and of the negative section is 0.2 sec. if this wave form impressed upon an RC differentiating circuit whose time constant is 0.2s, what are the steady-state maximum and minimum values of the output waveform? Prove that the area under the positive section equals that under negative section of the output waveform. What is the physical significance of the result? 8M

UNIT–II

3. a) Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics. 6M

   b) State and prove clamping circuit theorem. Sketch the output waveform that you would expect from the circuit shown in figure.

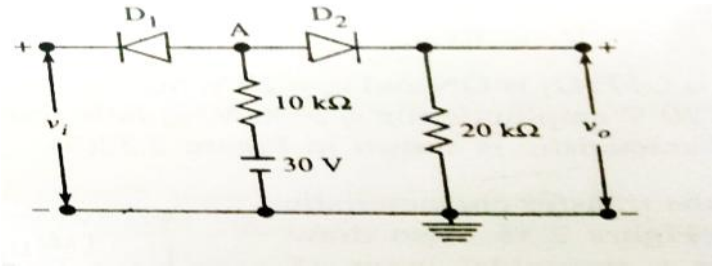


8M

OR

4. a) Explain transfer characteristics of emitter coupled clipper and derive necessary equations. 6M

   b) Draw the transfer characteristics for the clipper circuit shown. Assume ideal Diodes.



8M

UNIT–III

5. a) Explain and Derive the expression for frequency of oscillation of an Astable multi vibrator. 8M

   b) Design a collector coupled Astable multivibrator using NPN silicon transistors with h_{fe}=40, r_{bb}=200 supplied with V_{cc}=10V and circuit component values are R_c=1.2K and C=270 pF. 6M

OR

6. a) Explain the operation of a Monostable multivibrator and derive for the pulse width with necessary waveforms & circuits. 6M

   b) Design a symmetric collector-coupled astable multivibrator to generate a square wave of 10 kHz having peak-to-peak amplitude of 10 V where, h_{FE} min = 30, V_{CE}(sat) = 0.2 V, I_C(sat) = 2 mA 8M

UNIT–IV

7. a) Define and derive the terms slope error, displacement error and transmission error. 8M

   b) In the transistor bootstrap circuit, V_{CC}=25V, V_{BE}=-15V, R= 10kΩ, R_E = 15KΩ, R_B = 150KΩ, C= 0.05 µF, and C_1 =100 µF. the gating waveform has a duration Tg =300µS. The transistor parameters are h_{fe} = 1.1 KΩ, h_{re} =2.5X10^{-4} kΩ h_{fe} = 50, h_{oe} = 1/40 kΩ

      a) Draw the waveforms of I_{C1} and V_O
      b) What is the slope error of the sweep
      c) What is the retrace time for C discharge completely. 6M

OR

8. a) How is deviation of linearity expressed? What do you mean by sweep time and restoration time? 6M

   b) How a compensation circuit improves the linearity of a Bootstrap voltage time base generator? Discuss. 8M

UNIT–V

9. a) Draw and explain with relevant waveforms the process of frequency division by an Astable multivibrator. 8M

   b) Explain about phase delay and phase jitters. 6M

OR

10. a) Explain the synchronization of a sweep circuit with symmetrical signals. 6M

    b) Explain about unidirectional diode sampling gate. Write its advantages and disadvantages. 8M

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