Created by PDF Combine Unregistered Version

If you want to remove the watermark, Please register

Code No: R22041 **R10** SET - 1

II B. Tech II Semester Regular Examinations, August – 2014
ANALOG COMMUNICATIONS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) What is modulation? Why is modulation used in communication system?
   b) What do you understand of modulation index? What is its significance? (8M+7M)

2. a) Distinguish between DSB-AM, DSB-SC, and SSB-SC system of modulation, sketch their waveform.
   b) The modulating signal $x(t)=2\cos(2000\pi t) + \sin(4000\pi t)$ is applied to a DSB modulator operating with a carrier frequency of 100 kHz. Sketch the power spectral density of the modulator output. (8M+7M)

3. a) Discuss a suitable method of generating an SSB signal. Describe a method of detecting such signal.
   b) A speech signal, as in a telephone system, occupies a frequency range 300Hz - 3400Hz (considered as baseband up to 3400Hz). In a carrier system it is transmitted in the form of SSB signal. Calculate the bandwidth saving as compared to AM signal transmission and also estimate the amount of power saving. (7M+8M)

4. a) Derive an expression for an FM signal with carrier frequency f_c and a modulating signal $A_1\cos\omega_1 t + A_2\cos\omega_2 t$. Obtain an expression for its spectrum.
   b) Why an FM system is preferred over an AM system? (8M+7M)

5. a) Calculate the figure of merit for a DSB-SC system.
   b) Prove that narrowband FM offers no improvement in SNR over AM. (8M+7M)

6. a) What is the significance of frequency stability of a transmitter? Explain the methods to achieve frequency stability?
   b) Draw the block diagram of a typical AM transmitter. Discuss the function of each block in brief. (8M+7M)

7. a) Explain the operation of Ratio detector with the help of neat diagram.
   b) 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 455 kHz, determine the image frequency and its rejection for tuning at 25MHz. (8M+7M)

8. a) What do you mean by multiplexing? Explain TDM and FDM.
   b) State and explain sampling theorem in time domain.
   c) Explain difference between PPM and PWM. (6M+6M+3M)
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22041 **R10** SET - 2

II B. Tech II Semester Regular Examinations, August – 2014
ANALOG COMMUNICATIONS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) What is meant by the term amplitude modulation?
   b) Define the term modulation index for AM and explain its importance.
   c) Derive an expression for single tone amplitude modulated wave. (3M+5M+7M)

2. a) With a neat block diagram explain the demodulation process of DSB-SC signal.
   b) For a modulating signal $\cos 500\pi t$, determine the frequency components of DSB and DSB-SC signals when the carrier is $100\cos 5000\pi t$. Determine the power in the sidebands and carrier in each case. (7M+8M)

3. a) Describe Weaver's method of generation of SSB signals with the help of block diagram and suitable spectral diagrams.
   b) Compare the DSB and SSB systems.
   c) Determine the percentage of power saving when the carrier wave and one of the sidebands are suppressed in an AM wave modulated to a depth of 75 percentage. (8M+3M+4M)

4. a) Define and explain the following terms for FM wave
   i) carrier swing ii) frequency deviation and iii) percentage of modulation.
   b) Explain the salient features of wideband FM system.
   c) A carrier signal $10\cos(8000000\pi t)$ is modulated by a modulating signal $5\cos(30000\pi t)$.
   i) Find the bandwidth for frequency modulation assuming k_f = 15 kHz per volt
   ii) Assuming the same bandwidth, find k_p for phase modulation. (6M+3M+6M)

5. a) Compare the FM system with AM system from the point of view of noise performance.
   b) Explain, how noise can be calculated in a communication system.
   c) An AM receiver operates with a tone modulation, and the modulation index $m_a = 0.4$. The message signal is $20\cos(1000\pi t)$. Calculate the output SNR relative to the baseband performance. (5M+4M+6M)

6. a) With block diagram explain the working of phase modulated FM transmitter.
   b) What are the different types of AM transmitters?
   c) What is the significance of frequency stability of a transmitter and how the frequency stability can be achieved. (8M+3M+4M)
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22041 **R10** SET - 3

II B. Tech II Semester Regular Examinations, August – 2014
ANALOG COMMUNICATIONS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Derive the power relations for single-tone amplitude modulated wave.
   b) Explain the square-law diode modulation method for AM generation. (7M+8M)

2. a) Explain the working of suppressed carrier balanced modulator. State its advantages and applications.
   b) Why a DSB-SC modulation scheme is not much used inspite of the fact that it saves transmitter power as compared to AM?
   c) A signal $x(t) = 2\cos(1000\pi t) + \cos(2000\pi t)$ is multiplied by a carrier $10\cos(10^5\pi t)$. Give the expression for the upper sideband terms of product signal. (8M+4M+3M)

3. a) Explain what is meant by vestigial sideband transmission. What are its special characteristics? And how can these be achieved in practice. Discuss the specific examples where VSB is used.
   b) Show that if the output of a phase-shift modulator is an SSB signal, the difference of the signals at the summing junction produces the upper-sideband SSB signal. (8M+7M)

4. a) Derive an expression for an FM signal with carrier frequency f_c and a modulating signal $A_1\cos(\omega_1 t) + A_2\cos(\omega_2 t)$. Obtain an expression for the spectrum.
   b) Explain the difference between narrowband FM and wideband FM.
   c) What are the merits and limitations of FM. (7M+4M+4M)

5. a) Derive an expression of output SNR in an FM system.
   b) Prove that narrowband FM offers no improvements in SNR over AM. (8M+7M)

6. a) Draw the block diagram of a typical AM transmitter. Explain the function of each block in brief.
   b) What are the effects of frequency multiplication on the carrier frequency and the frequency deviation of an FM signal?
   c) What is the significance of Harmonic generator in transmitters? (8M+4M+3M)

7. a) Explain the functions of various sections of a superheterodyne receiver.
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22041 **R10** SET - 4

II B. Tech II Semester Regular Examinations, August – 2014
ANALOG COMMUNICATIONS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Draw the diode detector circuit and explain its action. (7M+8M)
   b) Show, giving a mathematical proof, how a square-law device can be used to generate an AM signal. Give complete diagram of the signal inputting and outputting arrangements.

2. a) Draw the circuit of a demodulator for DSB-SC signal and explain.
   b) Give mathematical expression for DSB-SC signal in time domain. Explain each term.
   c) Give comparison between DSB and SSB systems. (7M+4M+4M)

3. a) Discuss with a block diagram of a communication system using vestigial side band transmission.
   b) Compare VSB and SSB systems.
   c) For modulating signal $10\cos(600\pi t)$, determine the frequency components of DSB-Sc and SSB-SC signals when the carrier is $100\cos(10^4\pi t)$. Determine the power in the side bands and carrier in each case. (7M+3M+5M)

4. a) What are the various methods of frequency modulation commonly used in commercial applications. With a neat sketch explain the working of FET reactance modulator.
   b) Why is an FM system preferred over AM system?
   c) Consider an angle modulated signal $x_c(t) = 10\cos(\omega_c t + 3\cos\omega_m t)$, $f_m = 1$KHz. Assume the modulation to be FM. Determine the modulation index and find the transmission bandwidth when i) ω_m is increased by a factor of 4, and ii) ω_m is decreased by a factor of 4. (8M+3M+4M)

5. a) Calculate the figure of merit for a SSB-SC system.
   b) What is the significance of Pre emphasis and De emphasis in communication system? Explain in detail. (7M+8M)

6. a) What is transmitter? Give its applications.
   b) Explain the functions of peak limiters and peak clippers.
   c) With block diagram explain the working of phase modulated FM transmitter. (4M+4M+7M)

7. a) Why is the local oscillator frequency always made higher than the incoming signal frequency? 2M
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22043 **R10** SET - 1

II B. Tech II Semester Regular Examinations, August - 2014
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Derive the equations for the current gain, input impedance, voltage gain and output impedance of an emitter follower operating at low frequencies in terms of common emitter h-parameters
   b) Using Miller's theorem, prove that for a CE amplifier with resistive load the output voltage is $-g_mR_L$ (8M+7M)

2. a) A Common source FET amplifier has a load resistance of 500kΩ. The ac drain resistance of the device is 100kΩ and the transconductance is $0.8mAV^{-1}$. Calculate the voltage gain of the amplifier.
   b) Draw the block diagrams of four types of negative feedback amplifier circuits and explain which amplifier can be used to get higher input impedance and lower output impedance with appropriate derivation (8M+7M)

3. a) Draw the circuit diagram of Colpitt's oscillator. Explain its disadvantages. How it is overcome with Clapp oscillator.
   b) Prove that in an RC-phase shift oscillator, the minimum h_{fe} required is 29 to sustain the frequency of oscillations (8M+7M)

4. a) For a cascaded CE-CC configuration, the h-parameters are given as h_{ie}=1kΩ, $h_{re}=10^{-4}$, h_{fe}=50, hoe=10^{-4} A/V, h_{ic}=1kΩ, h_{rc}=1, h_{fc}= -51, $h_{oc}=10^{-4}$ A/V. Find the input and output impedances of the cascaded configuration
   b) Derive the expressions for overall voltage gain, current gain and power gain, when two identical amplifier stages are cascaded (8M+7M)

5. a) Define f_β and f_T and also derive the relation between them
   b) Given the following transistor measurement made at I_c = 5 mA, V_{ce} = 10V and at room temperature: h_{fe} = 100, h_{ie} = 600 ohm, Ai = 10 at 10MHz, C_c= 3 pF. Calculate f_β, f_T, C_e, $r_{b',e}$ and $r_{bb'}$. (8M+7M)

6. a) Derive the efficiency of the class-B power amplifier. Though class-B single ended power amplifier efficiency is high, why it is not used in practical circuits? Explain in detail.
   b) What are the disadvantages of using transformers in a push-pull amplifier? Explain a few techniques that eliminates the use of input transformers (8M+7M)

7. a) Compare single and double tuned amplifiers. Draw the circuit of double tuned amplifier and also explain how the frequency response of this amplifier is better than the single tuned amplifier
   b) What is importance of stagger tuning? Explain briefly about stagger tuned amplifiers. (8M+7M)

8. a) Explain how overload protection is provided in series voltage regulator
   b) Distinguish between series voltage regulator and shunt voltage regulator. (8M+7M)

|''||||'|''||''|''|
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22043 **R10** SET - 2

II B. Tech II Semester Regular Examinations, August - 2014
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Derive the equation for voltage gain and input impedance of a common source JFET amplifier with the help of its circuit diagram and its equivalent circuit.
   b) Calculate A_i R_i, A_v, R_o for the CC amplifier circuit with CE h-parameters given by h_{fe}=50, h_{ie}=1k, h_{oe} = 50k also the resistance parameters given by R_L=1k Ω, R_S= 100Ω, R_1 = 100k Ω, R_2 = 10kΩ, R_E = 1kΩ (7M+8M)

2. a) Apply the method of feedback circuit analysis for a voltage series feedback amplifier and explain all steps with appropriate diagrams
   b) Prove that negative feedback in amplifiers reduces the distortion and noise with appropriate equations (7M+8M)

3. a) Derive the equation for frequency of oscillations of a FET RC-phase shift Oscillator and also derive condition for sustained oscillations.
   b) Prove that the gain of Wien bridge oscillator using BJT amplifier must be at least 3 for the oscillations to occur. (7M+8M)

4. a) Show that the input impedance and overall voltage gain of a Darlington pair is much larger compared to an individual CE amplifier with same transistor.
   b) Derive the expression for current gain of a two stage RC coupled CE amplifiers (7M+8M)

5. a) What is Giacelletto model of a transistor? Discuss about various parameters in the model.
   b) Derive an expression for voltage gain of common source amplifier at high frequencies. (7M+8M)

6. a) Explain how the power amplifiers are classified based on class of operation and also compare them
   b) A single transistor is operating as an ideal class B amplifier with a 1-K load. A dc meter in the collector circuit reads 10mA. How much signal power is delivered to the load?
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22043 **R10** SET - 3

II B. Tech II Semester Regular Examinations, August - 2014
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Derive the equation for the gain of a common emitter amplifier with emitter resistance and also explain the effect of emitter resistance on the gain
   b) What is small signal model of a FET. Derive the relationship between small signal parameters of a FET. (7M+8M)

2. a) An Amplifier with negative feedback gives an output of 12.5V with an input of 1.5V. When feedback is removed, it requires 0.25V input for the same output. Find i) Value of voltage gain without feedback ii) Value of β, if the input and output are in phase and β is real.
   b) Explain the procedure to obtain the basic amplifier configuration without feedback but taking the loading of the feedback network into account (7M+8M)

3. a) Derive the expression for frequency of oscillation of BJT phase-shift oscillator and explain its operation with neat circuit diagram
   b) A crystal oscillator has the following parameters: L=0.33H, C=0.065pF, C=1.0pF and R=5.5 kΩ. i) Find the series resonant frequency. ii) Find the Q of the crystal. (7M+8M)

4. a) What is frequency response of an amplifier? Draw the equivalent circuits of RC coupled amplifier at low and high frequencies and derive the expression for voltage gain.
   b) Two FET based amplifiers with gains of 30 dB are cascaded together. Find the overall gain. Also find bandwidth of the overall circuit, if individual lower and higher 3 dB frequencies are 20 Hz and 20 kHz respectively. (7M+8M)

5. a) Draw the high frequency hybrid π model of a BJT and explain the each parameter of the Model with appropriate equation.
   b) Derive the equations for transconductance and input conductance of CE amplifier using high frequency model. (7M+8M)

6. a) Derive the expression for Maximum efficiency and working of transformer coupled Class A Amplifier
   b) Define collector circuit efficiency of a power amplifier and explain how total distortion can
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22043 **R10** SET - 4

II B. Tech II Semester Regular Examinations, August - 2014
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) An Emitter follower circuit has the following parameters R_L=1kΩ, R_S= 50Ω, h_{fe}=50, h_{ie} = 1kΩ, h_{oe} = 50kΩ, R_1 = 100kΩ, R_2 = 10kΩ, R_E = 10kΩ. Calculate R_i, R_o,A_v, and A_i for the above circuit.
   b) Derive an expression for the voltage gain of common source amplifier by using low frequency equivalent circuit. (7M+8M)

2. a) An amplifier has a mid band gain of 125 and bandwidth of 250 kHz. If 4% negative feedback is introduced and the new bandwidth and gain.
   b) Derive the equations for voltage gain, input impedance and output impedance of a CE amplifier with current-shunt negative feedback. (7M+8M)

3. a) Find the capacitance C and h_{fe} for the transistor Phase-Shift oscillator to provide a resonating frequency of 10kHZ. Assume R_1=25kΩ, R_2=60 kΩ, R_c=40kΩ, R=7.1kΩ and h_{ie}=1.8kΩ.
   b) Explain barkhausen criterion for sustained oscillations and also explain how the criterion is satisfied in a BJT RC- Phase-Shift oscillator (7M+8M)

4. a) For a Darlington pair the overall current gain and input impedance with an emitter resistance are given as 1130Ω and 1.2 *M*Ω respectively. Calculate the value of emitter resistance $R_{E.}$
   b) Three identical stages of amplifiers cascaded with lower and upper cut off frequencies given by 300Hz and 5kHz respectively, compute the overall lower and higher cut off frequencies with appropriate equations. (7M+8M)

5. a) The following low frequency parameters are known for a given transistor at I_c = 10 mA, V_{CE} =5V, h_{ie} = 500, h_{oe} = 10−5A/V, h_{fe} = 100, h_{re} = 10−4. At the same operating point f_T = 50 MHz, and C_c = 3 PF, compute the values of all the hybrid-π parameters.
   b) Draw the circuit of single stage RC coupled BJT amplifier. Discuss the effect of an emitter bypass capacitor on low frequency response. (7M+8M)

6. a) Differentiate between push-pull and complementary-symmetry configurations of a class B
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22042 **R10** SET - 1

II B. Tech II Semester Regular Examinations, August – 2014
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Derive an expression for electric field intensity due to a finite length line charge along the z-axis at an arbitrary point P(x, y, z).
   b) An infinite line charge ρ_L =10 nC/m parallel to z-axis is at x=2 m, y=3m in free space. Find E at (0, 1, 2) m (8M+7M)

2. a) Obtain an expression for differential magnetic field strength *dH* due to differential current element *Idl* at the origin in the positive Z-direction.
   b) Find the magnetic field strength, H at the centre of a square conducting loop of side '2a' in Z=0 plane, if the loop is carrying a current *I* in anti clock wise direction. (6M+9M)

3. a) Explain how the concept of displacement current was introduced by Maxwell to account for the production of magnetic fields in the empty space.
   b) An electric field in a medium which is source free is given by $\mathbf{E=2.5\cos(10^8t-\beta z)\,a_x\ V/m}$. Obtain B, H and D. Assume ε_r=1, μ_r=1 and σ=0. (7M+8M)

4. a) Derive the expression for attenuation constant and phase constant of uniform plane wave
   b) The electric field intensity associated with a plane wave travelling in a perfect dielectric medium is given by $\mathbf{E_x(z, t) = 10\cos(2\pi x10^7\ t - 0.1\pi z)\ V/m}$
   i) What is the velocity of propagation? ii) Write down an expression for the magnetic field intensity associated with the wave if $\mu = \mu_0$. (7M+8M)

5. a) Obtain the expression for reflection coefficient when a wave is incident on a dielectric with oblique incident perpendicular polarization
   b) A plane wave of frequency 2 MHz and E=2 mV/m is incident normally on a copper conductor. Find the average power density absorbed by the copper. Take ε_r =1, μr = 1 and σ =5.8x10^7 S/m for copper. (8M+7M)

6. Starting from Maxwell's equations, derive the expressions for the E and H field components for TE waves in parallel plane waveguide. (15M)

7. a) A coaxial lines with an outer diameter of 8 mm has 50 ohm characteristic impedance. If the dielectric constant of the insulation is 1.6, calculate the inner diameter and derive the formula can be used.
   b) Derive the characteristic impedance of a transmission line in terms of its line constants. (9M+6M)

8. a) Explain the principal of Impedance matching with quarter wave Transformer?
   b) Define VSWR. Give the relationship between VSWR and Reflection coefficient.
   c) Write the application of smith chart (6M+4M+5M)
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22042 **R10** SET - 2

II B. Tech II Semester Regular Examinations, August – 2014
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) State and prove the Gauss law.
   b) A line charge ρ_L=400 pc/m lies along the x-axis the surface of zero potential passes through the point P(0, 5, 12)m. Find the potential at (2, 3, -4) m. (8M+7M)

2. a) Define Magnetic flux density, scalar and vector magnetic potential.
   b) Find the total magnetic flux crossing a surface, $\varphi = \pi/2$, $1 \le \rho \le 2$ and $0 \le z \le 5$ m due to a vector magnetic potential $A = (-\rho^2/4)\, a_z$ Webers/m
   c) Derive Lorentz force equation and explain its significance. (4M+5M+6M)

3. a) State Maxwell's equations in differential form and write down their word statements.
   b) In a three dimensional space, divided into region 1 (X<0) and region2 (X>0), $\sigma_1=\sigma_2=0$, $\mathbf{E_1=1a_x+2a_y+3a_z V/m}$. Find E_2 and D_2, $\varepsilon_{r1}=1$, $\varepsilon_{r2}=2$. (7M+8M)

4. a) Define uniform plane wave. Prove that uniform plane wave does not have field components in the direction of propagation.
   b) The electric field in free space is given by $E = 50 \cos (10^8 t + \beta x)\, a_y$ V/m
      i) Find the direction of wave propagation.
      ii) Calculate β and the time it takes to travel a distance of $\lambda/2$
      iii) Sketch the wave at t = 0, T/4, and T/2. (5M+10M)

5. a) State and prove the Poynting theorem.
   b) A plane wave travelling wave in free space has an average Poynting vector of 1 W/ m^2. Find the average energy density. (12M+3M)

6. a) What are the field components for TM wave? Derive them, draw sketches for TM_{10} Mode.

   b) Derive the relation $\lambda = \dfrac{\lambda_c \lambda_g}{\sqrt{\lambda_g^2 + \lambda_c^2}}$, where λ is free space wavelength, λ_g is wavelength measured in the guide and λ_c is the cutoff wavelength. (9M+6M)
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22042 **R10** SET - 3

II B. Tech II Semester Regular Examinations, August – 2014
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) State the Coulomb's law of force between any two point charges and indicate the units of the quantities in the force equation.
   b) Derive Poisson's and Laplace's equations starting from Gauss law.
   c) Define capacitance. Find the capacitance of a parallel plate capacitor with dielectric mica filled between the plates '$\boldsymbol{\varepsilon_r}$ 'of the mica is 6 .The plates of capacitor are in shape with 0.254 cm side, separation between the two plates is 0.254 cm. (5M+5M+5M)

2. a) State Maxwell's equations for magnetostatic fields.
   b) Derive an expression for magnetic field strength, H, due to a current carrying conductor of finite length placed along the y- axis, at a point P in x-z plane and 'r' distant from the origin. Hence deduce expressions for H due to semi-infinite length of the conductor. (5M+10M)

3. a) Explain the equation of continuity in time varying fields.
   b) A certain material has $\sigma = 0$, $\varepsilon_r = 1$, if $\mathbf{H=4\sin(10^6t - 0.01z)\,a_y\ A/m}$. Find μ_r using Maxwell's equations. (7M+8M)

4. a) Discuss about propagation characteristics of EM waves in a conducting medium.
   b) In a nonmagnetic medium $\mathbf{E=50\cos(10^9\,t-8x)\,a_y + 40\sin(10^9\,t-8x)\,a_z}$ V/m. Find the dielectric constant ε_r and the corresponding H . (6M+9M)

5. a) Obtain the expression for reflection coefficient when a wave is incident on a dielectric with Oblique incident parallel polarization
   b) Derive the expression for surface impedance of conductor in terms of skin depth. (10M+5M)

6. a) Discuss about the existence of TEM wave in parallel plane guide.
   b) Define attenuation factor. Explain how the attenuation vary with frequency in parallel plate wave guide. (8M+7M)

7. a) A telephone wire 20 km long has the following constants per loop km: resistance 90Ω,
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22042 **R10** SET - 4

II B. Tech II Semester Regular Examinations, August – 2014
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Find the force on a 100μC charge at (0, 0, 3) m, if four like charges of 20 μC are located on x, y axis at ±4m.
   b) Define capacitance? Derive the expression for capacitance of a spherical type capacitor. (8M+7M)

2. a) Define and explain the Biot- Savart's law.
   b) Find magnetic field strength, H, on the z- axis at a point P(0,0,h), due to a current carrying Circular loop, $x^2 + y^2 = A^2$ in z=0 plane. (7M+8M)

3. a) Verify that the displacement current in the parallel plate capacitor is the same as the conduction current in the connecting wires.
   b) Derive the boundary conditions for dielectric to conductor interface. (7M+8M)

4. a) Find α, β, γ and η, for Ferrite at 10 GHz , $\varepsilon_r = 9$, $\mu_r = 4$, $\sigma = 10$ mhos/m.
   b) What is meant by polarization? Explain in detail about circular polarization. (7M+8M)

5. a) Define Brewster angle and derive an expression for Brewster angle when a wave is parallelly polarized.
   b) Derive the expression for surface impedance of a conductor. (8M+7M)

6. Starting from Maxwell's equations, derive the expressions for the E and H field components for TM waves in parallel plane waveguide. (15M)

7. a) List out types of transmission lines and draw their schematic diagrams.
   b) Describe the losses in transmission lines
   c) A transmission line in which no distortion is present has the following parameters: $Z_o = 60\Omega$,
~~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22021 **R10** SET - 1

II B. Tech II Semester Regular Examinations, August – 2014
PULSE AND DIGITAL CIRCUITS
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) What is meant by linear wave shaping? Give some examples of linear wave shaping circuits.
   b) Show that the output of a differentiator circuit is derivative of the input. What are the assumptions to be made in the derivation?

2. a) What is meant by comparator? Give the applications of voltage comparators?
   b) Determine the peak output voltage for a negative series clipper circuit connected to an input sinusoidal signal of peak value 12 V. The barrier potential for silicon diode is 0.7 V. Draw the circuit diagram and output waveform.

3. a) Describe and illustrate how the transistor acts a switch?
   b) Compare the various logic families?

4. a) What are different types of multivibrators? Explain the stable state of a multivibrator.
   b) Sketch the circuit diagram of Schmitt trigger and explain its operation.

5. a) In an astable multivibrator, the base resistors are of 12.5 kΩ and the capacitors are of 0.01μF Determine the pulse repetition rate.
   b) With the help of circuit diagrams explain the working of monostable multivibrator.

6. a) Define the following terms:
      i) Time base ii) Sweep voltage
      iii) Sweep speed error iv) Displacement error
   b) Enumerate the various methods which are employed for generating time base waves.

7. a) Explain the process of synchronization of a sweep circuit.
   b) Write notes on:
      i) Astable relaxation circuits ii) Monostable relaxation circuits

8. a) Draw the diagram of two diode sampling gates and explain
   b) Distinguish between *unidirectional* and *bi-directional* sampling gates.
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22021 **R10** SET - 2

II B. Tech II Semester Regular Examinations, August – 2014
PULSE AND DIGITAL CIRCUITS
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Draw RC high-pass circuit. Input to this circuit is represented as $Vu(t) - Vu(t - t_p)$. Sketch the input and output waveforms of this circuit.
   b) Explain how new wave shapes are generated from another waveform using some network.

2. a) What is the difference between the output from a clipping circuit and a clamping circuit? Explain with neat sketches.
   b) Determine the peak output voltage for a positive shunt clipper circuit connected to an input AC sinusoidal signal of peak value 10 V. The barrier potential for germanium diode is 0.3 V. Series resistor is of 400 Ω and load resistor is of 2 kΩ.

3. a) Compare the performance of TTL and ECL logic gates with respect to power dissipation, noise margin, cost and propagation delay time.
   b) Draw the circuit, symbol and truth-table of a normally open tri-state switch.

4. a) What is meant by multivibrator? Explain the operation of fixed-bias multivibrator.
   b) Explain how the astable multivibrator can be used as voltage to frequency converter.

5. a) For a monostable multivibrator calculate the input pulse width for the design values of R_C = 2 kΩ, R_B = 10 kΩ, C = 0.1 μF, V_{CC} = 10 V, $V_{BE(sat)}$ = 0.8 V.
   b) Explain the *triggering* in monostable multivibrator.

6. a) How time base generators can be classified? Differentiate between a triggered ramp generator and free-running time base generator.
   b) Explain with circuit diagrams Miller sweep and Miller bootstrap time base generators.
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22021 **R10** SET - 3

II B. Tech II Semester Regular Examinations, August – 2014
PULSE AND DIGITAL CIRCUITS
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Define unit-step function, ramp function and impulse function. Show that a pulse is combination of unit-step functions.
   b) What is meant by linear wave shaping?
   c) Why a capacitor in a high-pass RC circuit is named as blocking capacitor.

2. a) Define clipper. Explain the clipping using zero diodes.
   b) Draw a transistor clipper and explain its operation.

3. a) What is the difference between bipolar logic family and unipolar logic family? Explain.
   b) What do you understand by the terms fan-in and fan-out? Draw an RTL circuit.

4. a) Draw the circuit diagram of a Schmitt trigger and explain its operation.
   b) Write the applications of Schmitt trigger?

5. a) What is the function of commutating capacitors? What causes the rounded leading edge in the output waveforms of a multivibrator?
   b) Draw the circuit diagram of astable multivibrator and explains its operation.

6. a) What is meant by time base generator? Explain the expositional sweep circuit.
   b) Explain the basic principles of Miller and Bootstrap time base generator?

7. a) With the help of a circuit diagram explain how a tuned-collector sinusoidal oscillator is synchronized.
   b) Write notes on:
      i) Stability of relaxation dividers ii) Sine wave frequency division
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22021 **R10** SET - 4

II B. Tech II Semester Regular Examinations, August – 2014
PULSE AND DIGITAL CIRCUITS
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) What is a differentiator? Discuss how does it operate.
   b) Draw high-pass RC circuit. Explain its response to a square-wave input.

2. a) Explain how clipping at two independent levels can be achieved.
   b) Explain the operation of a diode comparator with a ramp input signal.

3. a) Draw the circuit diagram of CMOS NAND gate and explain its operation.
   b) Compare the performance of TTL and MOSFET logic gates.

4. a) How is an electronic switch superior to a mechanical switch? Why trigger pulses are essential for the operation of a bistable multivibrator?
   b) Draw the circuit of collector-coupled astable multivibrator and explain its operation.

5. a) Write notes on the following:
      i) Triggering in monostable multivibrator
      ii) Single-shot multivibrator
   b) Explain how an astable multivibrator gives a square-wave.

6. a) Draw transistor Bootstrap time base generator and explain its operation
   b) Which type of time base generator is used in electromagnetic and electrostatic deflection systems? Explain.

7. a) What do you understand by the term phase stability? Explain.
   b) Explain about frequency division in the sweep circuit.
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22023 **R10** SET - 1

II B. Tech II Semester Regular Examinations August - 2014
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Deduce $(70.65)_8 = (\ )_2 = (\ )_{16}$
   b) Represent numeric digits 0 to 9 at least in any two self complementing codes?
   c) Explain 1's complement representation of signed number? (5M+5M+5M)

2. a) Simplify and draw the AND/OR implementations for the following switching functions?
   i) $(\overline{A}+B)(\overline{B}+C)+(AB+C)$ ii) $\overline{(A+B)}\,\overline{(ABC)}+(\overline{\overline{A}\,C})$
   b) Explain how hamming code is constructed for single bit error detection and correction? (8M+7M)

3. a) Find the minimum product-of-sums form for the following functions
   i) $f_1 = \prod(0, 1, 2, 3, 4, 9, 10, 13, 14)$ ii) $f_2 = AB\overline{C} + AB + C + B\overline{C} + D\overline{B}$
   b) XS3 code is used to represent the ten decimal digits. Develop the decode logic for converting from XS3 to decimal? (8M+7M)

4. a) Implement 3 bit carry-look-ahead adder, what are its advantages?
   b) Design 4 bit XS3 adder/subtractor circuit and explain the circuit operation? (8M+7M)

5. a) What is the difference between encoder and priority encoder? How do you implement decimal to BCD priority encoder?
   b) Implement the following logic functions using 8 × 1 and 4 × 1 multiplexers?
   $f(A, B, C, D) = \sum m(1, 3, 4, 6, 7, 9, 10, 11, 14)$ (7M+8M)

6. a) Draw the logic diagram to implement 16 × 8 ROM and explain its architecture?
   b) Implement 4 bit binary to gray code conversion logic functions in PLA. (7M+8M)

7. a) Explain the operation of NAND latch J-K flip-flop with preset and clear inputs?
   b) Design 4 bit twisted ring counter. Also draw its state diagram and sequence table? (8M+7M)

8. Implement the following state table using S-R flip flops (15M)

PS	inputs, x_1, x_0		
	01	10	11
A	B,0	C,1	C,0
B	A,0	D,1	D,0
C	D,0	C,0	A,1
D	C,0	A,0	D,1
	NS, Z		
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22023 **R10** SET - 2

II B. Tech II Semester Regular Examinations August - 2014
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Explain how octal and hexadecimal number system is represented?
   b) Describe Excess – 3 code representation of numeric digits? What are its advantages?
   c) Subtract (– 127) from (– 115) using eight bit twos complement method? (5M+5M+5M)

2. a) How many of the input minterms are included in each of the following functions and how many are not? What are the minterm expressions for these two functions?
   i) $f_1 = A + C + BD$ ii) $f_2 = \overline{\overline{A + B} + \overline{C + D}}$
   b) Briefly describe how four bit gray code is constructed? What are its advantages? (10M+5M)

3. Minimize the following function using the Quine-McCluskey tabular method:
   $f(A, B, C, D, E) = \sum(0, 3, 4, 5, 11, 12, 13, 15)$ with don't care terms 2,6,8. (15M)

4. a) Implement a parallel adder to perform addition between two 8 bit numbers 11110011_2 and 10001101_2? Explore the result when the input carry at lowest bit is 0 and 1.
   b) Draw the logic diagram of BCD adder circuit? Explain its operation for 4 bit addition of two numbers. (8M+7M)

5. a) Explain with the help of logic diagram the operation of 3-to-8 line decoder? How such decoders are used in the realization of 1:64 de-multiplexers?
   b) A logic function has four inputs A, B, C and D that will produce output 1 whenever two adjacent input variables are 1s. Treat A and D are also adjacent. Implement this logic function using 8 × 1 and 4 × 1 multiplexers (7M+8M)

6. a) Write the programming table to implement BCD to using a PLA?
   b) Describe briefly how PAL is used to implement logic functions? Take the example of binary to BCD code conversion? (7M+8M)

7. a) Design up/down counter using J-K flip-flops to count the sequence 0, 3, 2, 6, 4, 0, …..
   b) Explain the working of 3-bit bi-directional shift register with the help of diagram? (8M+7M)
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22023 **R10** SET - 3

II B. Tech II Semester Regular Examinations August - 2014
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) How do you convert hexadecimal fractional number into decimal number and binary number?
   b) Describe different types of numeric codes? Explain them with suitable examples? (7M+8M)

2. a) Implement the following switching functions with minimum number of NOR gates?
   i) $\left(A\overline{C}+BC\right)\left(\overline{A}+C\right)$ ii) $A\overline{B}+\left(\overline{B}+\overline{C}\right)\overline{A}$
   b) What are the different degenerative and non degenerative forms of logic gate combinations in two level realization? Briefly explain them? (8M+7M)

3. Simplify the following Boolean expression using tabulation method?
   $f\left(A, B, C, D, E\right)=\sum\left(2, 3, 4, 7, 8, 11, 13, 14\right)$ with don't care terms 1, 5, 10. (15M)

4. a) Design half subtractor? Realize full subtractor using half subtractors and explain the circuit operation?
   b) Draw the logic diagram and explain the operation of the 4 bit XS3 adder/subtractor? (7M+8M)

5. a) Obtain logical functions to design decimal to octal priority encoder? Implement the circuit with NAND gates?
   b) Implement the following Boolean function using 1 × 8 de-multiplexer and 4 × 1 multiplexer? $F\left(A, B, C\right)=\overline{A}B+AC+\overline{B}C+\overline{A}\,\overline{C}$ (7M+8M)
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22023 **R10** SET - 3

6. a) How the ROM architecture is constructed? Draw structure of for 32 × 8 ROM?

   b) How the programming tables are prepared for PAL and PLA, use the following logic functions?

   i) $A(w, x, y, z) = \sum(0, 2, 5, 7, 8, 10, 12, 13)$

   ii) $B(w, x, y, z) = \sum(0, 1, 2, 6, 8, 9, 14, 15)$

   iii) $C(w, x, y, z) = \sum(0, 8, 14, 15)$ (8M+7M)

7. a) Explain the operation of J-K flip-flop? What is race around condition and how it is eliminated?

   b) Design a synchronous counter to count 3, 4, 6, 7, 3, 4, …….using J-K flip flops? (7M+8M)

8. Obtain a minimal state table using partition technique for the state table given below. Find the minimum length sequence that distinguishes state from A from state B. (15M)

PS	NS, Z	
	X=0	X=1
A	B,0	H,1
B	F,0	D,1
C	D,1	E,0
D	C,1	F,0
E	D,0	E,1
F	C,0	E,1
G	C,0	D,1
H	C,1	A,0

Code No: R22023 **R10** SET - 4

II B. Tech II Semester Regular Examinations August - 2014
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

1. a) Deduce X from the following?
   (i) $(A0.C)_{16} = (X)_8$ (ii) $(2.22)_3 = (X)_2$
   b) Briefly describe different methods of representing negative numbers? (8M+7M)

2. a) Simplify the following expressions
   i) $f_1 = (A + B + \overline{C})(A + \overline{B} + \overline{C})(\overline{A} + B + \overline{C})(\overline{A} + \overline{B} + \overline{C})$
   ii) $f_2 = A \,.\, \left[\overline{(\overline{A \oplus B}) \oplus C}\right]$
   b) What is meant by parity checking? Explain the different parity checking methods for single bit error detection and correction with suitable examples? (8M+7M)

3. a) Reduce the following expressions using Karnaugh map?
   i) $f_1 = AB + A\overline{C} + C + AD + A\overline{B}C + ABC$
   ii) $f_2 = \prod(0, 2, 8, 9, 10, 12, 13, 14)$
   b) Draw Karnaugh map and assign variables to the inputs of the AND XOR circuit shown in Figure 1, so that its output is $F(A, B, C, D) = \prod(6, 7, 12, 13)$ (8M+7M)

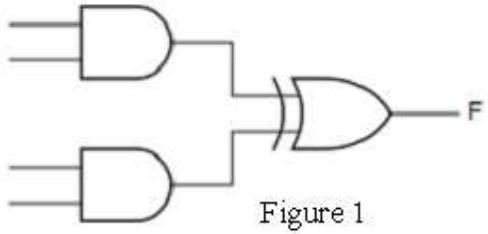

Figure 1

4. a) Describe the operation of full subtractor? Realize 4 bit binary subtractor and explain circuit operation?
~~~~~~~~~~~~~~~~~~~~~~~~

Code No: R22023 **R10** SET - 4

5. a) Draw the circuit diagram of 8 × 1 channel multiplexer and explain the circuit operation?
   b) Implement the following logic functions using 4-to-16-line decoder and 16 × 1 demultiplexer?
   i) $f_1 = \sum m(0, 1, 4, 7, 12, 14, 15)$
   ii) $f_2 = \sum m(1, 3, 6, 9, 12)$ (7M+8M)

6. a) What are the programmable logic devices? Explain them in brief?
   b) Obtain programmable logic to implement the following functions in PLA.
   $x(A, B, C, D) = \sum m(0, 2, 6, 7, 8, 9, 12, 13, 14)$
   $y(A, B, C, D) = \sum m(0, 3, 7, 9, 11, 12, 14)$ (7M+8M)

7. a) Describe the operation of universal shift register with the help of diagram?
   b) Design mod-9 asynchronous counter using D flip flop?
   (7M+8M)

8. Simplify the state table

PS	inputs, xy			
	xy=00	01	10	11
A	A,0	A,0	B,1	C,0
B	A,0	B,0	D,0	F,1
C	C,0	B,0	B,1	A,0
D	D,0	C,0	E,1	C,0
E	A,0	E,0	B,1	C,0
F	E,0	E,0	F,0	F,0
	NS, Z			

(15M)