14EC EI 402

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2016 **Common for ECE & EIE**

Fourth Semester **Electronic Circuits -I**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a. Define TUF

b. Define efficiency of a rectifier.

c. Draw BJT small signal mode.

d. Which BJT configuration is used for impedance matching?

e. What is the effect of placing emitter bypass capacitor in the CE amplifier?

f. What are the applications of power amplifiers?

g. Define cross over distortion.

h. What are the disadvantages of negative feedback amplifier?

i. An amplifier with gain 200 is provided with negative feedback of ratio 0.05. Find the new gain.

j. What is the effect of negative feedback on the bandwidth and distortion in an amplifier?

k. What are the conditions for obtaining oscillations?

l. Draw the equivalent circuit of quartz crystal.

UNIT-I

2. a. Draw the circuit diagram of the FWR and derive the expression for ripple factor without filter and with capacitor filter. (6M)

b. A self-biased CE amplifier with bypass capacitor uses R_C=4KΩ, ($R_1 \parallel R_2$) =1.3MΩ, V_{CC}=12V, I_C=1mA and transistor having h_{fe}= 100, h_{ie}=2600Ω, h_{re}=2.5 x 10^{-4}, h_{oe}= 25μ A/V. Compute A_V, A_I, R_i, R_o. (6M)

(OR)

3. a. Draw the circuit diagram of the FWR and derive expression for ripple factor with LC filter. (6M)

b. A voltage source of internal resistance R_s =600Ω drives a CC amplifier using load resistance R_L =1KΩ . The CE H parameters are h_{ie} =1200 Ω, h_{re} =2 x 10^{-4} , h_{fe} =60 and , h_{oe} =25 μA/v. Compute A_I , A_V, R_I, R_o using approximate analysis. (6M)

UNIT-II

4. a. Draw the circuit diagram of the Transformer coupled Class A power amplifier and find its efficiency. (6M)

b. Draw the small signal low frequency model of common source amplifier and derive the expressions for A_V, R_L, R_o. (6M)

(OR)

5. a. Draw the circuit diagram for Class-B push pull Amplifier and find its maximum efficiency. (6M)

b. Draw the small signal model of common drain amplifier and derive the expression for A_V, R_i, R_o. (6M)

UNIT-III

6. a. Derive the expression for input and output impedances of a voltage shunt feedback amplifier. (6M)

b. Draw the practical circuit diagram of voltage shunt feedback amplifier using BJT. Derive its input and output impedances with and without feedback. (6M)

(OR)

7. a. Derive the expression for input and output impedances of a voltage series feedback amplifier. (6M)

b. Draw the practical circuit diagram of voltage series feedback amplifier using BJT. Derive its input and output impedances with and without feedback. (6M)

UNIT-IV

8. a. Draw the circuit diagram of Hartley oscillator. Derive the expression for frequency of oscillations and minimum gain required by an amplifier. (8M)

b. Determine the frequency of Hartley oscillator if L_1 = 100μ H and L_2 = 1m H, M=20μ H and C=20pF. (4M)

(OR)

9. a. Draw the circuit diagram of RC phase shift oscillator using FET. Derive the expression for frequency of oscillations and minimum gain required by an amplifier. (8M)

b. Explain the frequency stability criterion for oscillators. (4M)

14EC 403

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2016 **Electronics & Communication Engineering**

Fourth Semester **EMFT**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a) State Gauss's law analytically?
b) State the relation between the electric field, **E** and the electric potential, V at a point?
c) Write the expression for V due to a line charge distribution?
d) Define capacitance of a single conductor?
e) State the boundary condition on the normal components in electrostatic fields?
f) Define electric current?
g) State the constitutive relation for the magnetic field vectors?
h) What is the boundary condition on the tangential components in magnetostatics?
i) State the types of electric currents?
j) Define an electromagnetic wave?
k) What are the units for the permittivity of a material medium?
l) Make the word statements of any one Maxwell's equations that involve closed surfaces?

UNIT I

2. a) State and explain Coulomb's law and hence define the electric field intensity? 6M
   b) A charge Q_A = - 20 μC is located at A(-6, 4, 7)m and another charge Q_B = 50 μC is located at B(5, 8, -2)m in free space. Determine the force on the charge Q_B due to the charge Q_A by finding electric field intensity? 6M

(OR)

3. a) Derive the expression for the electric field intensity **E** at a point in the field region due to a standard surface charge distribution? 7M
   b) Find the potential at r = 5m due to a point charge, Q = 500 pC placed at the origin? 5M

UNIT-II

4. a) Show that the capacitance of an isolated sphere of radius, R is given by $4\pi\varepsilon_0 R$? 6M
   b) State the boundary conditions in electrostatic field and prove any one of them? 6M

(OR)

5. a) Determine the capacitance per unit length of co-axial conducting cylinders? 8M
   b) Determine the relaxation time for a material with $\sigma = 10^{-17}$ S/m and $\varepsilon_r = 6$. What is the electrical nature of the above material? 4M

UNIT III

6. a) Derive the expression for the energy stored in a magnetostatic field and hence define magnetic energy density? 6M
   b) Find the force per unit length on two long, straight, parallel conductors carrying a current of 10 A each in the same direction, if the distance between them is 20 cm? 6M

(OR)

7. a) A conducting filamentary triangle joins points A (3, 1, 1)m, B (5, 4, 2)m and C (1, 2, 4)m. The segment AB carries a current of 0.2 A in $\mathbf{a}_{AB}$ direction. The magnetic field present in the region is given by $\mathbf{B} = 0.2\,\mathbf{a}_x - 0.1\,\mathbf{a}_y + 0.3\,\mathbf{a}_z$ T. Determine the torque on the loop about an origin at A? 8M

   b) Classify the magnetic materials. Define permeability of a material? 4M

UNIT-IV

8. a) State the Maxwell's equations in integral form and make their word statements? 6M

   b) Derive the various characteristics of a uniform plane wave travelling in a given direction? 6M

(OR)

9. a) Derive the expression for the attenuation constant and phase shift constant of an uniform plane wave travelling in a medium with permittivity , ε F/m, permeability, μ H/m and conductivity , σ S/m at a frequency, f Hz? 6M

   b) The electric field of a plane wave travelling in a non-magnetic medium is given by the following expression:

   $$\mathbf{E} = 0.5 \cos (0.5\pi \times 10^9 - 7.6\,z)\,\mathbf{a}_x + 0.866 \cos (0.5\pi \times 10^9 - 7.6\,z)\,\mathbf{a}_y \text{ V/m}$$

   Determine, i) the type of polarization of the wave,
   ii) the direction of the propagation of the wave, and
   iii) the expression for the magnetic field intensity, **H**. 6M

14EC404

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2016 **Electronics and Communication Engineering**

Fourth Semester **Analog Communication**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1 Answer all questions (1X12=12 Marks)

a) What is the need for Modulation.
b) Draw the frequency spectrum of DSB-SC and VSB.
c) Which Modulation Technique is used in Television.
d) Write the General Expression of an FM signal.
e) State Carsons rule
f) List the possible detectors in FM.
g) Define Sampling Theorem.
h) Define Random Variable.
i) What is meant by Statistical Average and define it.
j) List any two properties of Auto Correlation Function.
k) Define Noise Figure.
l) What is the essence of De-emphasis circuit.

UNIT I

2 a) Derive an expression for AM wave and draw its frequency Spectrum. 6M

b) The signal $v(t) = (1 + m\cos\omega_m t)\cos\omega_c t$ is detected using a diode envelope detector. Sketch the detector output when m = 2 6M

(OR)

3 a) An amplitude modulated amplifier provides an output of 106 watts at 100% modulation. The internal loss is 20watts.
   i) What is the unmodulated carrier power
   ii) What power output is required from the modulator. (Baseband signal)
   iii) if the percentage modulator is reduced to 75% how much output is needed from the modulator. 6M

b) Explain the principle of square law detector with a neat circuit diagram. 6M

UNIT II

4 a) A sinusoidal voltage with amplitude of 100V and a frequency of 100 MHz is frequency modulated by a sinusoidal signal of 20 kHz to generate a frequency deviation of 80 kHz. Find the amplitude of the carrier signal and all sidebands up to fourth sideband present in the modulated signal. Draw the spectrum. 6M

b) With neat block diagrams explain direct and indirect methods of FM generation 6M

(OR)

5 a) Explain the demodulation of FM signal with the help of PLL. 8M

b) Bring out the comparison between FM and AM. 4M

UNIT III

6 a) Explain the generation of pulse position modulation. 6M

b) Distinguish between Joint probability and conditional probability. 6M

(OR)

7 a) Explain the generation of a single polarity PAM. 6M

b) Write short notes on “Arbitrary Noise Sources”. 6M

UNIT IV

8 a) Derive an expression for SNR output of FM system 6M

b) Distinguish between pre emphasis and de-emphasis with neat figures 6M

(OR)

9 a) Explain the noise performance of SSB - SC receiver and prove its S/N Ratio is unity. 6M

b) Explain the IF amplifier circuit and its purpose in the receiver. 6M

Hall Ticket Number:

II/IV B.Tech (Regular/Supply) DEGREE EXAMINATION

November, 2016 — **Common ECE, EEE, EIE & ME**

Fourth Semester — **Mathematics - IV**

Time: Three Hours — **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a) Is $f(z) = xy + iy$ analytic?

b) State Cauchy-Riemann equations when $f(z)$ is in polar form.

c) Find critical points of $f(z) = z + \frac{1}{z}$.

d) State Cauchy's integral formula.

e) Evaluate $\oint_c \frac{e^z}{(z-3)^2} dz$ where c: $|z| = 2$.

f) Evaluate $\oint_c z dz$ where c is the straight line from $(1,1)$ to $(2,1)$.

g) Expand $f(z) = \frac{1}{(z-1)(z-2)}$ for $|z| < 1$.

h) Find the nature of singularity of $f(z) = e^{1/z}$.

i) Find the poles of $f(z) = \dfrac{z-3}{z^2+2z+5}$

j) Write Bessel's equation.

k) Write Legendre's equation.

l) Write the Rodrigue's formula.

UNIT – I

2. a) Find all the roots of $(1+i)^{1/4}$. (6M)

b) Find the analytic function in terms of z whose real part is $y + e^x cosy$. (6M)

(OR)

3. a) Find the linear fractional transformation that maps -1, 0, 1 onto 1,-1, ∞. (6M)

b) Verify whether sin hz is analytic or not. (6M)

UNIT – II

4. a) Integrate $\overline{(z)}^2$ from 0 to 2+i along the real axis to 2 and then vertically to 2+i. (6M)

b) State and prove Cauchy's theorem. (6M)

(OR)

5. a) Use the Cauchy's integral formula to evaluate $\oint_c \frac{e^{2z}}{(z+1)^4} dz$ where c is $|z| = 2$. (6M)

b) Evaluate $\oint_c \frac{\cos(\pi z^2)}{(z-1)(z-2)} dz$ where c is $|z| = 3$. (6M)

UNIT – III

6. a) Expand $\cos z$ in a Taylor's series about $z = \frac{\pi}{4}$. (6M)

b) Find Laurent series expansion of the function $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$. (6M)

(OR)

7. a) Find all the poles and the residue at each pole of $\frac{2z-1}{z(z+1)(z+3)}$. (6M)

b) Evaluate $\oint_c \tan z \, dz$ where c is the circle $|z| = 2$. (6M)

UNIT – IV

8. a) Prove that $xJ_n'(x) = nJ_n(x) - xJ_{n+1}(x)$. (6M)

b) Prove that $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\cos x$. (6M)

(OR)

9. a) Prove that $(n+1)P_{n+1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x)$. (6M)

b) Express $P(x) = x^4 + 2x^3 + 2x^2 - x - 3$ in terms of Legendre polynomials. (6M)

EC EE EI222

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2016 **Common for ECE, EEE & EIE**

Third Semester **Electronic Circuit-I**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a) Why CE configuration is most preferred for amplifier circuit
b) State Miller's theorem
c) Draw the small signal model of FET Amplifier
d) What is meant by power amplifier
e) Define second order distortion
f) What are the advantage of power amplifier
g) Classify feedback Amplifiers
h) How negative feedback reduces distortion in an amplifier?
i) Draw the equivalent circuit of current-series feedback amplifier
j) What are the Barkhausen conditions
k) Define rectifier?
l) Define peak inverse voltage (PIV)

UNITI

2 a) Draw the circuit diagram of low frequency small signal h-parameter model, Derive the expressionA_I, A_V,R_I,R_O,A_{VS} and A_{IS} (6M)

b) For the emitter follower R_L=5kΩ,R_s=0.5Ωk . Calculate A_i, R_i,A_v,A_{vs} and R_o. Assume h_{fe}=50, h_{ie}=1kΩ, hoe=25 μ amp/volts. (6M)

(OR)

3 a) Explain the circuit diagram of darlington pair and derive express foroverallvoltage gain, current gain and input impedance. (6M)

b) Draw the approximate hybrid model of CE with emitter resistance and calculate current gain, input impedance and output admittance. (6M)

UNIT- II

4 a) Explain Class A circuit biasing with necessary diagrams. (6M)

b) Explain the class B push pull amplifier and derive the efficiency. (6M)

(OR)

5 a) Explain the Class A power amplifier and derive the efficiency for the inductive load. (6M)

b) Explain the Class AB power amplifier with neat diagram. (6M)

UNIT-III

6 a) Explain the concept of a feedback and give the advantages and disadvantages of negative feedback amplifier. (6M)

b) Derive the expressions for input impedance, and output impedance of a voltage series feedback amplifier. (6M)

(OR)

6 a) Derive the expressions for input impedance and output impedance of a current shunt feedback amplifier with its equivalent circuit. (6M)

b) Explain the effect of negative feedback on gain, noise and bandwidth. (6M)

UNIT- IV

8 a) Draw and explain RC phase shift oscillator using BJT and derive anexpression for frequency of oscillation. (6M)

b) A FWR circuit user two silicon diodes with a forward resistance of 20 ohms each. A DC voltmeterconnected across load of 1K ohm reads55.4V. Calculate efficiency and transformer secondary voltage rating. (6M)

(OR)

9 a) Draw the circuit of a Wein bridge oscillator and explain its operation. (6M)

b) A Half wave rectifier has a load resistance of 3.5K ohms if the diode andthe secondary of the transformer has a total resistance of 800 ohms and input voltage and an ac signal of 240V. Determine (i) Peak,average, rms value of current (ii) DC power output (iii) ac power input (iv) ripple factor. (6M)

EC 223

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November2016 **Electronics & Communication Engineering**

Fourth Semester **Electrical Technology**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a . What is the requirement for the production of dynamically induced EMF?

b. Draw the circuit diagram of long shunt compound motor?

c. Define armature reaction of DC generator?

d . What is the relationship between line and phase current in star connection?

e. How to reduce eddy current loss in transformer?

f. What if condition for maximum efficiency in transformer?

g. What are the classifications of 1-Ø induction motor?

h. Define slip in 3-Ø induction motor?

i. Why the induction motor rotate with below synchronous speed?

j . State any one method of starting of synchronous motor?

k. What are the advantages to placing of armature winding on stator in synchronous machine?

l. What is the functioning of damper winding in synchronous machine?

UNIT – I

2.a	Explain the construction of DC machine with neat diagram?	6M
2.b	The load torque of a DC series motor varies as the cube of its speed. If the motor has negligible armature resistance and it draws a current of 60A at 450V, determine the value of the resistance to be inserted to reduce its speed by 60% ?	6M

(OR)

3.a	Explain the operation of three point starter with neat diagram?	6M
3.b	Explain how back EMF produced in DC motor and its significance?	6M

UNIT – II

4.a	Derive the relationship between line and phase quantities in delta connection?	6 M
4.b	A 200/400V,10KVA,50Hz single phase transformer has a core loss of 75W and full loss copper loss of 150W. Calculate KVA rating and efficiency at full load 0.8pf when the transformer is now connected as an auto transformer to give 200/600V.	6 M

(OR)

5.a	Explain the principle operation of Transformer and draw its phasor diagram?	6M
5.b	Explain the OC and SC tests of a Transformer to find the efficiency andregulation?	6M

UNIT – III

6.a	Explain how the rotating magnetic field is formed in 3-Ø induction motor?	6M
6.b	Describe the Speed –Torque characteristics of 3-Ø induction motor?	6M

(OR)

7.a	Explain different starting methods of 1-Ø induction motor?	8M
7.b	Explain the principle of operation of stepper motor?	4M

UNIT – IV

8.a	What are different classifications of synchronous machines and explain with neat diagram?	4M
8.b	Explain synchronous impedance method to find the regulation of alternator?	8M

(OR)

9.a	Explain the principle of operation of synchronous motor with neat diagram?	6M
9.b	A 250 KVA ,3300V star connected 3-Ø synchronous generator has resistance and synchronous reactance per phase of 0.25Ω and 3.5Ω respectively. Calculate the voltage regulation at full load 0.8 power factor lagging.	6M

EC224

Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2016 **Electronics & Communication Engineering**

Fourth Semester **Transmission Lines and Wave Guides**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a) Define propagation constant.
b) What is meant by infinite line.
c) Give the Condition for Distortionless Line.
d) Define standing wave ratio.
e) Define reflection coefficient.
f) What are the advantages of double stub impedance matching over single stubMatching.
g) Why TEM wave is impossible in rectangular wave guides.
h) Define dominant mode
i) Sketch the excitation of TE_{10} mode in a Rectangular wave guide.
j) List out the features of symmetrical strip transmission lines.
k) Which is the dominant mode in circular wave guide?
l) What is the main difference between Rectangular waveguide and Circular waveguide?

UNITI

2. a) Derive an expression for the characteristic impedance and propagation constant in terms of primary constants. (6M)

b) A telephone line has R = 30 Ω/km, L = 100mH/km, G = 0, and C = 20 μ F/kmat f = 1kHz? Obtaini) The characteristic impedance of a line. ii) The propagation constant. (6M)

(OR)

3. a) Derive the fundamental transmission Line equations and from them find expression for voltage and current along an infinite line. (6M)

b) A distortion less line at 100MHz has characteristic impedance 75Ω,α=0.06N P/m , $\mu=2.8\times10^{8}$m/sec. Calculate the line parameters R,L,Cand G. (6M)

UNIT II

4 a)Derive an expression for the input impedance of the line in terms of Reflection coefficient. (6M)

b)The VSWR on a lossless 75Ω line is 4.0. Calculate the maximum and minimumvalues of voltage and current on the line when the incident voltage is 30V . (6M)

(OR)

5. a) Discuss the construction of single stub matching. (6M)

b) Describe in detail about double stub matching of a transmission line. What are the advantages of this method over single stub matching. (6M)

UNITIII

6. a) Evaluate the field components of TM waves between parallel plates propagating in Z direction. (6M)

b)Explain velocity of propagation in waves between parallel plates. (6M) **(OR)**

7. a)Evaluate the field components of TE waves in rectangular waveguides. (6M)

b) Calculate the broad wall dimension of a rectangular waveguide when the cut-off frequency for TE_{10}mode is (a) 3GHz, (b) 30GHz (6M)

UNITIV

8. a) Evaluate the field components of TM waves in circular waveguides. (6M)

b) Sketch and represent Field lines for TM_{01} and TE_{11} in a transverse plane of circular waveguide. (6M)

(OR)

9. a)Explain about – Asymmetric strip transmission line . (6M)

b) Discuss about parallel plate transmission. (6M)