Substitute Subject

Hall Ticket Number :										

R-17

Code: 7G334

II B.Tech. II Semester Regular Examinations May 2019

Analog Electronics-I

(Electrical and Electronics 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) Compare CB, CE and CC amplifiers in terms of voltage and current gains and input and output impedances. 7M

   b) Explain the different coupling schemes used in amplifiers. 7M

OR

2. a) In a typical single stage CE amplifier , R_S=1K and R_L=1.2 K .Calculate Current gain, Voltage gain, input resistance and output resistances if h_{ie} = 1.1K, $h_{re} = 2\times10^{-4}$, h_{fe} = 50 and h_{oe} = 25µA/V. 7M

   b) Draw the circuit diagram of Common Collector amplifier. Derive the expressions for voltage gain, current gain, and input, output impedances in terms of h-parameters of CE transistor. 7M

UNIT–II

3. a) What are the characteristics of an amplifier that are modified by negative feedback? 7M

   b) Show that, input and output resistances of current series feedback amplifier are increased by a factor (1+Aβ) with feedback 7M

OR

4. a) An amplifier has a mid-frequency gain of 100 and a band width of 200KHz.
   (i) What will be the new bandwidth and gain, if 5% negative feedback is introduced?
   (ii) What should be the amount of feedback, if the band width is to be restricted to 1MHz? 7M

   b) Draw the four types of feedback amplifiers and explain them briefly 7M

UNIT–III

5. a) Derive an expression for frequency of oscillation of a RC phase-shift oscillator using a Transistor. 8M

   b) When RC –phase shift oscillator provided sinusoidal output of frequency 8Khz, if Transistor has h_{fe}=50, h_{ie}=2kΩ and R_c=5 kΩ. Calculate the values of Resistor, capacitor Values used in feedback network. 6M

OR

6. a) Draw the circuit diagram of Hartley oscillator and Explain its working. Derive the Expression for frequency of oscillation. 7M

   b) Deduce the Barkhausen criterion for the generation of sustained oscillations .How is the oscillations initiated. 7M

UNIT–IV

7. a) Show that in the case of Series fed class – A power amplifier maximum Theoretical efficiency is 25%. 7M

   b) Class- A power amplifier has maximum and minimum output voltages of 20Vand 2V Calculate conversion efficiency
      i. If load is series fed
      ii. If load is transformer coupled 7M

OR

8. a) Derive the expression for maximum collector power dissipation $(P_d)_{max}$ in case of Class-B power amplifiers. What is its maximum value? 7M

   b) Derive the expression for maximum conversion efficiency for a Transformer coupled Class A power amplifier. 7M

UNIT–V

9. a) Prove that a low pass circuit acts as an integrator. Derive an expression for the output voltage levels under steady state conditions of a low pass circuit excited by a ramp input. 7M

   b) With neat circuit diagram, explain the working of positive clipping with positive reference. 7M

OR

10. a) Explain clearly with the help of a circuit and waveforms the response of high pass RC circuit for step and pulse input. 7M

    b) Draw the positive clamping circuit and explain its principle of operation. 7M

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Hall Ticket Number :										

R-17

Code: 7G241

II B.Tech. II Semester Regular Examinations May 2019

AC Machines-I

(Electrical and Electronics 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) Develop an expression for the induced emf of a single phase transformer. 7M

   b) A 4400 V, 50 Hz transformer has a hysteresis loss of 1200 W, eddy current loss of 1800 W and full load copper loss of 4000 W. Compute the new values of hysteresis and eddy current losses if the transformer is supplied at 6600 V, 75 Hz. 7M

OR

2. a) A 230V/115V single phase transformer takes a no load current of 2A at a power factor of 0.2 lagging with low voltage winding kept open. If the low voltage winding is now loaded to take a current of 15 A at 0.8 power factor lagging, determine the current taken by high voltage winding. 7M

   b) Analyze the performance of single phase transformer under lagging load with the help of phasor diagram. 7M

UNIT–II

3. The following readings were obtained from O.C. and S.C. tests on 8 kVA, 400/120 V, 50 Hz transformer

O.C. test (l.v. side)	:	120 V, 4 A, 75 W
S.C. test (h.v. side)	:	9.5 V, 20 A, 110 W

Calculate:
i) The equivalent circuit (approximate) parameters and
ii) Voltage regulation and efficiency for 0.8 lagging power factor load 14M

OR

4. a) Explain how auto transformer is differs from two winding transformer and summarize the merits and demerits of auto transformer. 7M

   b) What information is obtained from short circuit test of a transformer? Describe the procedures involved in short circuit test. 7M

UNIT–III

5. Describe the constructional features of different types three phase transformer with neat diagram. Also, summarize their advantages and disadvantages. 14M

OR

6. With the help of connection and vector diagrams explain how a 2-phase supply can be obtained from a 3-phase supply. 14M

UNIT–IV

7. a) With neat sketch, explain how rotating magnetic field is produced in a three phase induction motor. 7M

   b) Explain the torque-slip characteristics of three phase induction motor with neat sketch. 7M

OR

8. a) A 6-pole, 3-phase, 50 Hz induction motor runs on full load with a slip of 5%. If the rotor standstill impedance is (0.015+j0.0075) Ω, calculate the available maximum torque in terms of full load torque. Also, determine the speed at which the maximum torque occurs. 7M

   b) Compare squirrel cage induction motor with slip ring induction motor. 7M

UNIT–V

9. a) Describe briefly on different starting methods adopted for squirrel cage induction motor. 7M

   b) Explain the principle of operation of an induction generator. 7M

OR

10. A 15 kW, 415 V, 4-pole, 50 Hz delta connected motor gave the following results on test (voltages and currents are in line values):

No load test	415 V	10.5 A	1510 W
Blocked rotor test	105 V	28 A	2040 W

Using the approximate circuit model, determine:

i) The line current and power factor for rated output,

ii) The maximum torque and

iii) The starting torque and line current if the motor is started with the stator star connected.

Assume that the stator and rotor copper losses are equal at standstill. 14M

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Hall Ticket Number :										

R-17

Code: 7G345

II B.Tech. II Semester Regular Examinations May 2019

Analog Electronics-II

(Electrical and Electronics 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) What is an IC Classifications? List out the IC Classifications and Explain 7M

   b) Explain in detail the DC & AC characteristics of Op-amp with relevant expressions. 7M

OR

2. a) Describe the internal block diagram of an Op-amp and explain each block in detail 7M

   b) In an op-amp, the non-inverting input is 500µv and the inverting input is 200µv differential gain is 3000 and CMMR= 10^5. Find the Common mode gain, output voltage. 7M

UNIT–II

3. a) Discuss the Op-amp ideal differentiator and mention its drawbacks. Also explain how to overcome these drawbacks with practical differentiator. 10M

   b) Design Op-amp Differentiator that differentiate an input signal with fmax=100Hz. 4M

OR

4. a) Draw the summing Amplifiers including all basic expressions for inverting and non-inverting. 10M

   b) Examine the output of Op-amp integrator circuit for an applied unit step input signal. 4M

UNIT–III

5. a) What is a comparator? What are the applications of comparator? 4M

   b) Explain the working of Schmitt trigger circuit using Op-amp with necessary diagrams. 10M

OR

6. a) Design a Triangular wave generator using Op-amp. 6M

   b) Discuss the working of full wave precision rectifier. 8M

UNIT–IV

7. a) Identify the features of IC555 Timer. 4M

   b) Design a Monostable Multi-vibrator using IC555 timer. 10M

OR

8. a) Explain the basic principle and operation individual blocks of PLL 10M

   b) Explain how PLL is used as an AM detector. 4M

UNIT–V

9. a) Construct the Inverted R-2R DAC and explain in detail. 4M

   b) Explain the working principle of counter type ADC with a neat diagram. 10M

OR

10. a) Report the various specifications of DAC/ADC in detail. 6M

    b) Explain the working principle of Successive approximation ADC with a neat diagram. 8M

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Regular Examinations May 2019

Complex Variables and Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

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

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

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

OR

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

   b) Separate the real and imaginary parts of

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

UNIT–II

3. Derive Cauchy Riemann equations in cartesian coordinates 14M

OR

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

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

UNIT–III

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

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

   $1<|z+1|<3$. 7M

OR

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

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

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

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

UNIT–IV

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

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

OR

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

UNIT–V

9. a) Show that $w = \frac{i-z}{i+z}$ maps the real axis of z-plane into the circle $|w| = 1$ and the half plane $y > 0$ into the interior of the unit circle $|w| = 1$ in the w-plane. 7M

b) Find the bilinear transformation which maps 1, i, -1 to 2, i, -2 respectively. Find the fixed and critical points of the transformation. 7M

OR

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

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

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Hall Ticket Number :

R-17

Code: 7G244

II B.Tech. II Semester Regular Examinations May 2019

Electrical Circuits-II

(Electrical and Electronics 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) An unbalanced 4 wire star connected load has balanced voltage of 400V, the loads are $Z_1=(4+j8)\Omega$; $Z_2=(3+j4)\Omega$; $Z_3=(15+j20)\Omega$. Calculate the i) line current ii) current with neutral wire iii) total power. 7M

   b) A three phase, balanced delta connected load of (4+j8) Ω is connected across a 400V, 3 – Ø balanced supply. Determine the phase currents. Assume the phase sequence to be RYB. 7M

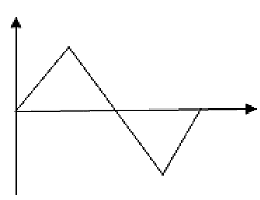
OR

2. a) A three phase balanced delta connected load of (4+j8)Ω is connected across a 400V, 3 ϕ balanced supply. Determine the phase currents and line currents. Assume the phase sequence to be RYB. Also calculate the power drawn by the load. 7M

   b) The readings of the two watt meters used to measure power in a capacitive load are -3000W and 8000W respectively. Calculate the input power. Assume RYB sequence. 7M

UNIT–II

3. a) Find the expression of f (t) in the graph shown below.



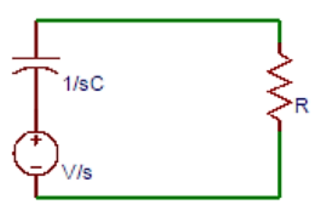
7M

   b) Find the Laplace transform of the function f (t) = $3t^4 - 2t^3 + 4e^{-3t} - 2\sin 5t + 3\cos 2t$. 7M

OR

4. a) Determine the inverse transform of F (s) = $(s^2+s+1)/s(s+5)(s+3)$. 7M

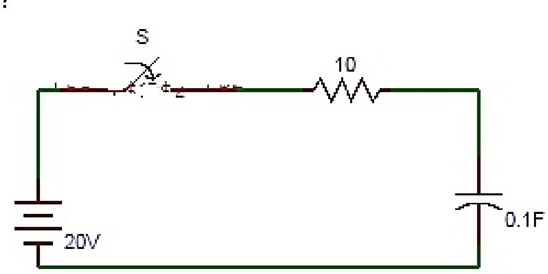
   b) From the circuit shown below, find the value of current in the loop.



7M

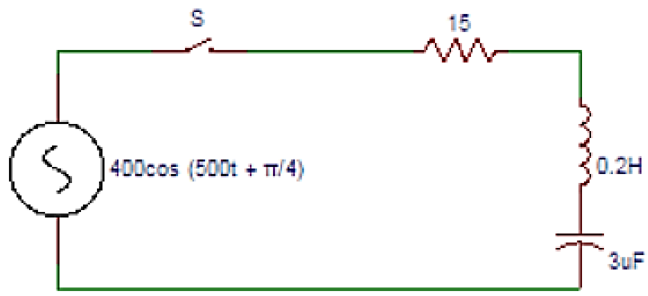
UNIT–III

5. a) A series R-C circuit consists of resistor of 10 and capacitor of 0.1F as shown in the figure. A constant voltage of 20V is applied to the circuit at t = 0. What is the current in the circuit at t = 0?



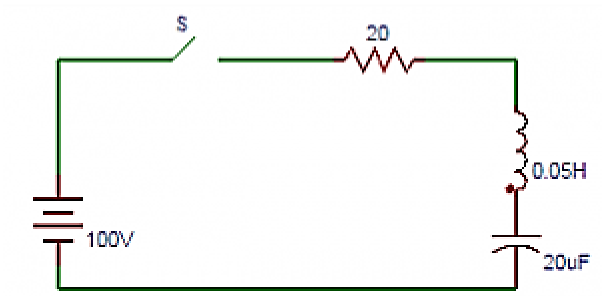
7M

b) In the circuit shown below, the switch is closed at t = 0. Applied voltage is v(t)=400cos (500t+π/4). Resistance R=15Ω, inductance L=0.2H and capacitance=3 µF. Find the roots of the characteristic equation. 7M



OR

6. a) The circuit shown in the figure consists of resistance, capacitance and inductance in series with a 100V source when the switch is closed at t = 0. Find the equation obtained from the circuit in terms of current. 7M



b) A series RL circuit with R=50Ω and L=0.2H has a Sinusoidal Voltage source v=150 Sin500t.Find the expression for i(t). 7M

UNIT–IV

7. a) What is the Fourier sine series of f(x) = π /4 – x/ 2 , where 0 <x<π. 7M

b) Compute the Fourier transform of the signal

$$x(t) = \begin{cases} 1, & for -5 \le t \le 5 \\ 0, & for\, 5 < |t| \le 10 \end{cases}$$

x(t) periodic with period 20. 7M

OR

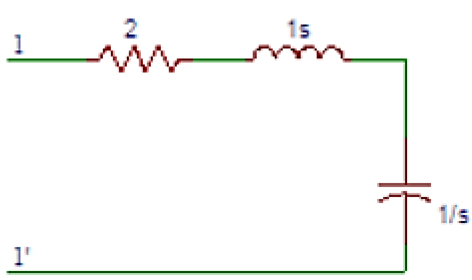
8. a) Calculate the Fourier series of f(x) = x^2 where 0 <x< 2π and f has period 2π. 7M

b) Compute the Fourier transform of the signal $x(t)=\cos(2\pi t)$. 7M

UNIT–V

9. a) Write the necessary conditions for transfer function. 7M

b) For the network shown in the figure, find the driving point impedance. 7M



OR

10. a) Explain the procedure of testing passive real functions. 7M

b) Consider the impedance function Y(s)=(s^2+4s+3)/(3s^2+18s+24). Find the value of R_0, R_1, C_1, R_2 and C_2 after realizing by second Foster method. 7M

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Hall Ticket Number :										

R-17

Code: **7G242**

II B.Tech. II Semester Regular Examinations May 2019

Electromagnetic Fields

(Electrical and Electronics 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 Electric Filed Intensity and derive the expression for EFI due to Infinite surface charge? 7M

   b) Define Gauss law and derive the expression for it? Verify the application of Gauss law for deriving the expression for EFI due to infinite line charge? 7M

OR

2. a) State and prove Gauss law. Write applications of Gauss's law. Describe any one application? 7M

   b) Calculate the force on a unit positive charge at P(x=2m, y=0) due to the charges Q1 at origin and Q2 at (x=1m, y=0) where Q1 = 1000 pico coulombs Q2 = -2000 pico coulombs. 7M

UNIT–II

3. a) Differentiate the convection current density and conduction current density? 7M

   b) Derive the boundary conditions between media having two dielectric material s having different permittivity? 7M

OR

4. a) Derive an expression for electric field intensity at point P due to an electric dipole. Also find E at the same point? 7M

   b) The space between two large parallel plates separated by a distance d=1 mm is filled with dielectric of relative permeability 20. Determine the capacitance if the plates are connected to (i) 10 V battery (ii) 20 V battery (iii) 100 V battery and (iv) 50 V battery? 7M

UNIT–III

5. a) Write the differences between scalar and vector magnetic potential? 7M

   b) Find the expression for the Magnetic field intensity due to infinite line current carrying conductor? 7M

OR

6. a) Define and derive the expression for Ampere's Circuital law and explain how it is useful in the study of magnetic fields? 7M

   b) Find the magnetic field intensity at center of a square of sides equal to 5 m and carrying a current equal to 10 A.? 7M

UNIT–IV

7. a) Two infinitely long parallel conductors are separated by a distance 'd'. Find the force per unit length exerted by one of the conductor on the other if the currents in the two conductors are I_1 and I_2? 7M

   b) Derive an expression for a torque on a closed rectangular loop carrying current? 7M

OR

8. a) Obtain the expression for inductance of a solenoid. 4M

   b) A solenoid of 500 turns is wound on a steel structure of 0.5 m mean diameter, 4 cm long and 0.02 m^2 cross sectional area. An excitation of 4000 A/m produces a flux density of 1 Tesla. Find the inductance of the coil and energy stored. 10M

UNIT–V

. a) Explain the faraday's laws of electromagnetic induction and derive the expression for induced EMF? 7M

   b) State and prove Poynting theorem and write a short note on physical significance of the poynting vector? 7M

OR

10. a) Derive the Maxwell's equations in point and integral form for time varying fields? 7M

   b) Show that power loss in a conductor is given as product of voltage and current using Poynting theorem? 7M

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Hall Ticket Number :										

R-17

Code: 7G243

II B.Tech. II Semester Regular Examinations May 2019

Linear Control Systems

(Electrical and Electronics 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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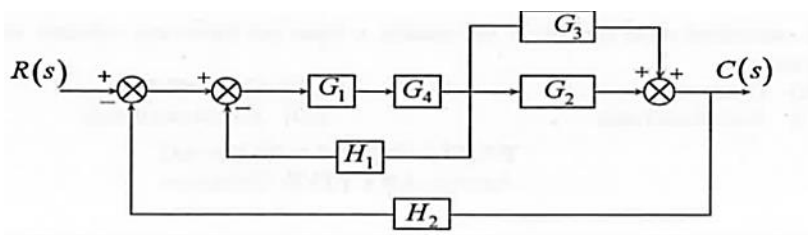
UNIT–I

1. a) Derive an expression for the transfer function of an armature controlled DC servo motor. 10M

b) Distinguish open loop and closed loop control system. 4M

OR

2. Find the closed loop transfer function of the given system using block reduction technique.



14M

UNIT–II

3. Derive the time domain specifications of a second order system 14M

OR

4. For the given system, $G(s) = \frac{1}{(s^2+s+2)}$ and $H(s) = \frac{1}{(s+1)}$, find the steady state error constants for unit step, unit ramp and unit parabolic input $\left(\frac{t^2}{2}\right) u(t)$ 14M

UNIT–III

5. A unity feedback control system has an open loop transfer function of $G(s) = \frac{K}{s(s^2+4s+3)}$. Sketch the root locus 14M

OR

6. a) A system has $(s)H(s) = \frac{K}{s(s+2)(s+4)(s+8)}$. Where K is positive. Determine the range of K for stability. 10M

b) Discuss the effect of adding a pole/zero to the open loop transfer function and its effect on the root locus of a system 4M

UNIT–IV

7. Plot the bode diagram for the transfer function $G(s) = \frac{K}{s(1+0.4s)(1+0.1s)}$. Also obtain the gain and phase cross over frequencies 14M

OR

8. Sketch the Nyquist plot for a system with loop transfer function $G(s)H(s) = \frac{K(1+s)^2}{s^3}$. Find the range of value of K for which the system is stable. 14M

UNIT–V

9. Derive the transfer function of Lag, Lead and Lag-Lead compensator using electrical network 14M

OR

10. Design a lead compensator for a system with transfer function $G(s) = \frac{k}{s^2(1+0.1s)}$ for the specifications: acceleration error constant K_a=10 and phase margin $\emptyset_{PM} = 30^o$ 14M

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