Hall Ticket Number :										

R-17

Code: 7G345

II B.Tech. II Semester Supplementary Examinations May/June 2022

Analog Electronics-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks
		UNIT–I	
1.	a)	Draw and explain the pin diagram of Ic741 and explain each pin.	7M
	b)	Design an inverting Op Amp with gain 100.	7M
		OR	
2.		Discuss the AC characteristics of an Op Amp	14M
		UNIT–II	
3.	a)	Illustrate the operation of Subtractor circuit using IC 741.	7M
	b)	Explain the operation of current to voltage converter using Op-Amp.	7M
		OR	
4.	a)	Examine the output of Op-amp integrator circuit for an applied unit step input and sine input signal	10M
	b)	Consider the lossy integrator with components R_1=10 KΩ, R_F=100 KΩ, C_F=10nF. Determine the lower frequency limit of integrator.	4M
		UNIT–III	
5.	a)	Discuss the operation of Log Amplifier..	7M
	b)	Demonstrate the operation of Precision Full-wave Rectifier.	7M
		OR	
6.	a)	Explain how astable multivibrator can be used as Square wave generator.	9M
	b)	Design an astable multivibrator for output frequency of 1KHz	5M
		UNIT–IV	
7.	a)	Draw and Explain the operation of Schmitt trigger using IC555.	7M
	b)	Demonstrate how a PLL can be used as Frequency Multiplier.	7M
		OR	
8.	a)	How a monostable multivibrator can be used as missing pulse detector? Explain.	8M
	b)	Define the following for a phase locked loop i) Lock in range ii) Capture range	6M
		UNIT–V	
9.	a)	What is the main disadvantage of Flash ADC? And With the help of a neat diagram explain its operation.	7M
	b)	With help of neat diagram explain the operation of counter type ADC.	7M
		OR	
10.	a)	Construct the Inverted R-2R DAC and explain in detail	8M
	b)	Calculate the values of V_{LSB}, V_{MSB} and full-scale output voltage for an 8-bit DAC for the range of 0v to 10V.	6M

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations May/June 2022

Complex Variables & Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) To show that $\Gamma\left(\frac{1}{2}\right)=\sqrt{®}$ 7M

   b) To show that $\Gamma(n)=(n-1)\Gamma(n-1)$ 7M

OR

2. a) Show that $\Gamma(n)=\int_0^1\left(\log\frac{1}{x}\right)^{n-1}dx \ , n>0$ 7M

   b) Evaluate $\int_0^1\sqrt{\cot^{-}}d^{-}$ 7M

UNIT–II

3. a) Show that $f(z)=z+2\bar{z}$ is not analytic anywhere in the complex plane. 7M

   b) Determine whether the function $2xy+i\left(x^2-y^2\right)$ is analytic. 7M

OR

4. State and prove Cauchy-Riemann equation in Cartesian coordinates. 14M

UNIT–III

5. Evaluate $\int_c\frac{\log z}{(z-1)^3}dz$ where $c:|z-1|=\frac{1}{2}$ using Cauchy's integral formula 14M

OR

6. Integrate $f(z)=x^2+ixy$ from A(1,1) to B(2,8) along
   (i) The straight line AB (ii) The curve $c: x=t,\ y=t^3$ 14M

UNIT–IV

7. Find the poles of the function $\frac{z+1}{z^2(z-2)}$ and Residues at the poles 14M

OR

8. Evaluate $\oint_c\frac{4-3z}{z(z-1)(z-2)}dz$ where c is the circle $|z|=\frac{3}{2}$ using Residue theorem. 14M

UNIT–V

9. Under the Transformation $w=\frac{1}{z}$ find the image of the circle $|z-2i|=2$ 14M

OR

10. Determine the bilinear Transformation that maps the point $(1-2i,\ 2+i,\ 2+3i)$ into the points $(2+i,\ 1+3i,\ 4)$ 14M

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Hall Ticket Number :										

R-17

Code: 7G244

II B.Tech. II Semester Supplementary Examinations May/June 2022

Electrical Circuits-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) Prove $I_L=\sqrt{3}\, I_{ph}$ for 3-Φ, balanced, Δ- connected system. 7M

   b) Illustrate the readings of two wattmeter's on a 3-wire, 240V system with balanced star connected load of $10\angle 30^0\ \Omega$. 7M

OR

2. A three phase balanced system supplies 230V to a delta connected load whose phase impedances are equal to (3.54+j3.54) Ω. Determine the line current and draw the phasor diagram 14M

UNIT–II

3. Determine the Laplace transform of the following functions

   i) f (t) = $(4t^3+t^2-6t+7)$ ii) $e^{-4t}\sin 5t$ 14M

OR

4. Formulate the step response of series RLC Circuit using Laplace Transform. 14M

UNIT–III

5. In a series RLC circuit has R=10Ω, L=1H and C=10microfarad is connected to a constant voltage 10V. Determine $i(0^+)$, $\frac{d}{dt}i(0+)$ and $\frac{d^2}{dt^2}i(0+)$ 14M

OR

6. An unchanged 5μF capacitor is connected in series with a 30KΩ resistor across a 110 V D.C supply. Calculate i) time constant of the circuit. ii) initial charging current 14M

UNIT–IV

7. Determine the effective value of voltage and current if,

   $v(t) = 10+6\cos(t+45^0)+1.8\cos(2t-10^0)$ and

   $i(t) = 3+1.4\cos(t+20^0)+0.5\cos(2t)$ 14M

OR

8. Define definition of Fourier Transform pair and discuss any three properties of Fourier transform. 14M

UNIT–V

9. Define positive real function and mention it's properties 14M

OR

10. Test whether the following polynomials are Hurwitz or Not

    i) $P(S)= S^3+2S^2+4S+2$ ii) $S^4+2S^3+2S^2+6S+10$ 14M

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Hall Ticket Number :										

R-17

Code: 7G242

II B.Tech. II Semester Supplementary Examinations May/June 2022

Electromagnetic Fields

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) State and explain Gauss law. 5M
   b) Derive the expression for D due to finite line charge using Gauss law. 9M

OR

2. a) Derive the expression for D due to an infinite sheet of charge using Gauss law. 7M
   b) What is the expression for work done in moving a point charge in an electrostatic field? 7M

UNIT–II

3. a) Derive the expression for capacitance of a parallel plate capacitor with composite dielectrics. 7M
   b) The capacitance of a condenser formed by two parallel metal sheets each 100 cm^2 in area separated by a dielectric 2 mm thick is $2x10^{-4}$ micro Farads. A potential of 20 kV is applied. Find
      (i) Electric Flux
      (ii) Potential Gradient in kV/cm
      (iii) The relative permittivity of material
      (iv) Electric Flux density 7M

OR

4. a) Distinguish between conduction and convection current densities. 7M
   b) A spherical condenser has a capacitance of 54 pF. It consists of two concentric spheres differing in radii by 4 cm and having air as dielectric. Find the radii. 7M

UNIT–III

5. a) State and explain Biot-savart's law. 7M
   b) Derive the expression for H due to a solenoid using Biotsavarts law. 7M

OR

6. a) Using Biot-savart's law find H at the centre of the circular conductor. 7M
   b) A circular loop of radius 0.2 m causes a current of 10 A. Find the magnetic field intensity H at point (0,0,0.5). 7M

UNIT–IV

7. a) Derive an expression for the force between two parallel conductors? 7M
   b) A rectangular loop in Z=0 plane has corners at (0,0,0), (1,0,0), (1,2,0) and (0,2,0).The loop carries a current of 5A. Find the total force on the loop produced by the magnetic field $B=5a_x+2a_y-4a_z$ Wb/m^2 7M

OR

8. a) Derive an expression for energy stored in a magnetic field. 7M
   b) A solenoid with 300 turns is 300 mm ling and 30 mm in diameter. If the current flowing through it is 500 mA, find (i) Inductance and (ii) energy stored in solenoid. Assume relative permeability as 1. 7M

UNIT–V

9. a) A copper wire carries a conduction current of 1A.Determine the displacement current in the wire at 1 MHz. For copper $\varepsilon = \varepsilon_o$ and $\sigma = 5.8x10^7$ S/m. 7M
   b) Derive the expression of one of the Maxwell's equation $Curl(E)=\frac{-\partial B}{\partial t}$ 7M

OR

10. a) Derive the modified Ampere's circuital law for time varying fields. 7M
    b) A straight conductor of 2 m lies along X-axis from the origin. When a field of $B=0.04\ a_x$ Tesla is applied with a velocity of $u=2.5 \sin 10^3 t\ a_z$ m/s, calculate the motional emf. 7M

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Hall Ticket Number :										

R-17

Code: 7G243

II B.Tech. II Semester Supplementary Examinations May / June 2022

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

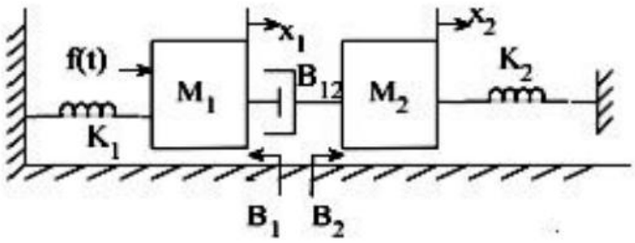
1. a) Define Signal flow graph. Why do we choose SFG over block reduction techniques? State the advantages of SFG. Explain Mason's gain 7M

   b) Draw the signal flow graph for the following equations

   $x_2+5x_3-2x_1=0 \quad X_3+2x_4-4x_2=0 \quad X_4-8x_3=0$ 7M

OR

2. For the mechanical system shown below, derive the transfer functionX1(s)/F(s). Also draw the force-voltage and force-current analogous circuits.



14M

UNIT–II

3. The open loop transfer function of a unity feedback system is given by $G(s) = \frac{K}{S(TS+1)}$.Where K and T are positive constants. By what factor should the amplifier gain be reduced so that the peak overshoot of the unit step response of the system is reduced from 75% to 25%. 14M

OR

4. Explain the effect of proportional, integral, derivative Controllers, their advantages and disadvantages 14M

UNIT–III

5. a) Explain about BIBO stability. 7M

   b) What are the difficulties in forming Routh array? Explain how to overcome. 7M

OR

6. Given the unity feedback system whose open loop transfer function is $G(s)=\frac{KS(2+S)}{(S^2-4S+8)(S+3)}$. Determine the range of K for stability. 14M

UNIT–IV

7. a) Define GM & PM. 7M

   b) List the advantages and disadvantages of Frequency response 7M

OR

8. Sketch the polar plot for the system with open loop transfer function $G(s)H(S) = \frac{1}{(S+2)(S+4)}$.Determine Phase margin and Gain margin 14M

UNIT–V

9. Explain the controllability and observability with an example. 14M

OR

10. Estimate the complete state controllability and observability of the system $A=\begin{bmatrix}-1 & 1 & 0\\ 0 & -4 & 2\\ 0 & 0 & -10\end{bmatrix}; B=\begin{bmatrix}1\\0\\-1\end{bmatrix}; C=\begin{bmatrix}1 & 0 & 1\end{bmatrix}$. Also find the transfer function and output of the system. 14M

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Hall Ticket Number :										

R-17

Code: 7G241

II B.Tech. II Semester Supplementary Examinations May / June 2022

AC Machines-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. a) With the help of phasor diagram, explain the operation of a transformer under no load. 7M
   b) Explain how the Iron losses are reduced by doing laminations. 7M

OR

2. a) Explain the principle of operation of an ideal transformer. Also draw its vector diagram. 7M
   b) With help of neat diagram, explain the construction of core type transformer. 7M

UNIT–II

3. a) Derive necessary condition for zero and negative regulation of a transformer. 6M
   b) The following readings were obtained from O.C. and S.C. tests on 8 kVA 400/ 120V, 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; 110W
   Obtain (a) Voltage regulation and efficiency for 0.8 lagging power factor load,
   (b) The efficiency at half full – load and 0.8 power factor load. 8M

OR

4. a) Derive the condition for saving of a copper in a single phase auto transformer. 7M
   b) The maximum efficiency of 100 kVA, 3kV/500V, 50Hz single phase transformer is 95% which occurs at $3/4^{th}$ of full load, unity power factor. If the impedance is 10%, Calculate regulation at full load at 0.8 power factor lagging. 7M

UNIT–III

5. a) What is the need of connecting the transformers in parallel? Mentions the conditions for parallel operating of transformers. 7M
   b) Two 1-Ph transformers share a load of 400KVA at power factor o.8 lagging. Their equivalent impedance referred to secondary windings are $(1+j2.5)\Omega$ and $(1.5+j3)\Omega$ respectively. Calculate the load shared by each transformer. 7M

OR

6. Explain the Scott connection operation with necessary circuit diagrams 14M

UNIT–IV

7. a) Write the comparison between cage rotor and slip ring rotor with neat diagrams 6M
   b) Obtain the relation between rotor input, rotor copper losses and rotor output in terms of slip(s). 8M

OR

8. A 3-phase induction motor runs at 1440 rpm at full load when supplied power from 50Hz, 3-phase line. Calculate: (i) The number of poles. (ii) Slip of full load.
   (iii) Speed of the rotor field w.r.t rotor. (iv) Speed of the rotor field w.r.t stator. 14M

UNIT–V

9. a) Explain the speed control of induction motor using Rotor resistance control. 7M
   b) Two 50 Hz, 3-Φ induction motor having 6 and 4-poles respectively are cumulatively cascaded. The 6-pole motor being connected to the main supply. Determine frequencies of rotor currents and the slips referred to each stator field. If the set has slip of 2%. 7M

OR

10. Draw the circle diagram from no-load and short circuit test on a 3-phase,
    14.92 kW, 440V, 6-pole induction motor from the following results:
    No-load : 400V , 11A, PF=0.2 Short-circuit test : 100V, 25A, PF=0.4
    Rotor Cu losses at stand still is half the total Cu losses from the circle diagram, find
    (i) Line current, slip, efficiency and pf at full load a (ii) Maximum torque. 14M

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