Hall Ticket Number :										

R-17

Code: 7G345

II B.Tech. II Semester Supplementary Examinations April 2023

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.		Discuss the DC characteristics of an Op Amp.	14M
		OR	
2.	a)	Explain in detail the compensation techniques of Op-amp with relevant expressions	8M
	b)	For the non-inverting amplifier R_1 = 1 KΩ and R_f = 10 KΩ. Calculate the maximum output offset voltage due to V_{ios} and I_B. the op-amp V_{ios} = 10mV and I_B = 300 nA, I_{os} = 50 nA. Calculate the value of R_{comp} needed to reduce the effect of I_B	6M
		UNIT–II	
3.	a)	Illustrate the operation of inverting summer circuit using IC 741.	7M
	b)	Illustrate the operation of Subtractor circuit using IC 741.	7M
		OR	
4.		Discuss the drawbacks of Op-Amp Integrator and Explain how to overcome them using Lossy Integrator	14M
		UNIT–III	
5.	a)	Explain the operation of Precision Half-wave Rectifier.	7M
	b)	Discuss the operation of Log Amplifier.	7M
		OR	
6.	a)	Demonstrate the applications of Op-Amp Comparator.	7M
	b)	Illustrate the operation of Schmitt Trigger circuit using IC 741.	7M
		UNIT–IV	
7.		Design an astable multivibrator circuit using IC 555, and derive expression for frequency of the output.	14M
		OR	
8.	a)	Draw the pin diagram of IC 555 and list out its applications	6M
	b)	Explain the basic principle of operation using block schematic of a PLL.	8M
		UNIT–V	
9.		What are the specifications that we need to consider in ADC/DAC design? Explain in detail.	14M
		OR	
10.	a)	With the help of neat diagram explain the operation of Monolithic DAC	7M
	b)	For the DAC converter using R-2R ladder network having a full-scale voltage 10V and R = 30MΩ. i) Determine the size of each step if R_f =27kΩ ii) Calculate output voltage when the inputs are b_0 & b_1 at 5V, b_2 & b_3 at 0V.	7M

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations April 2023

Complex Variables & Special Functions

(Common to EEE and 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.		Separate the real and imaginary parts of $Tan\ h\ z$	14M
		OR	
2.	a)	Symmetry of Beta function B(m, n)=B(n, m)	7M
	b)	Evaluate $\int_0^1 \frac{x^2}{\sqrt{1-x^5}}dx$ in terms of B function	7M
		UNIT–II	
3.		Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\left\|\mathrm{Re}\,al\ f(z)\right\|^2 = 2\left\|f'(z)\right\|^2$ where $w = f(z)$ is analytic.	14M
		OR	
4.	a)	Show that $f(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane.	7M
	b)	Determine whether the function $2xy + i(x^2 - y^2)$ is analytic.	7M
		UNIT–III	
5.		Expand $f(z) = \frac{1}{z^2 - 3z + 2}$ in the region $(1)\ 0 < \left\|z-1\right| < 1 \quad (2)\ 1 < \left|z\right| < 2$	14M
		OR	
6.		Evaluate $\int_c (y^2 + 2xy)dx + (x^2 - 2xy)dy$ where c is the boundary of the region by $y = x^2$ *and* $x = y^2$	14M
		UNIT–IV	
7.		Find the Residue of $\frac{z^2 - 2z}{(z+1)^2(z^2+1)}$	14M
		OR	
8.	a)	Find the poles and Residues at each pole $\frac{ze^z}{(z-1)^3}$	7M
	b)	Use Residue theorem to find the number of zeros of the polynomial $z^{10} - 6z^7 + 3z^3 + 1$ if $\left|z\right| < 1$	7M
		UNIT–V	
9.		Find the bilinear Transformation which maps the points $(-i,\ 0,\ i)$ into the points $(-1,\ i,\ 1)$ respectively.	14M
		OR	
10.		Show that the transform $w = \frac{2z+3}{z-4}$ changes the circle $x^2 + y^2 - 4x = 0$ into the straight line 4u+3=0	14M

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Hall Ticket Number :										

R-17

Code: 7G244

II B.Tech. II Semester Supplementary Examinations April 2023

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. An induction motor draws a three phase power. Two wattmeter measurement is applied to find total power. If W_1= 10KW and W_2= 5KW determine the total active power, reactive power and power factor. 14M

OR

2. a) List out the advantages of three phase system over single phase system. 7M
   b) Explain the two-wattmeter method of 3-Φ power measurement. 7M

UNIT–II

3. a) The output of the system is $Y(s)=\frac{10}{S(S^2+S+100\sqrt{2})}$ the steady state value of y(t) 7M
   b) Determine the Laplace transform of the following function f (t) = $\frac{(2-2e^{-2t})}{t}$ 7M

OR

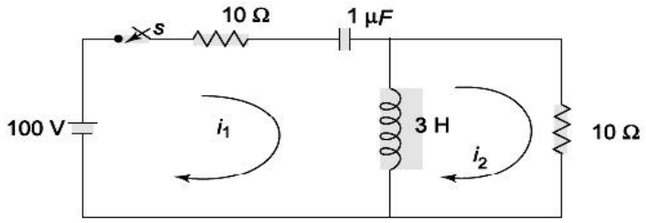
4. a) State and Prove Initial value theorem and Final value theorem. 7M
   b) Explain the step response of series RL Circuit using Laplace Transform. 7M

UNIT–III

5. Derive the expression for current response of RL series circuit with a DC excitation. 14M

OR

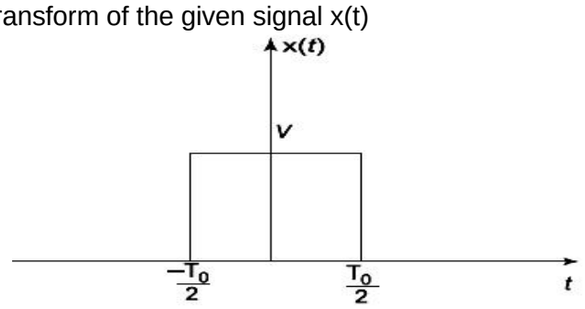
6. In the circuit show in fig. determine the current expression for i_1 (t) and i_2 (t) when switch is closed at t=0. Assume circuit has no initial energy.



14M

UNIT–IV

7. a) Determine the trigonometric Fourier series for the square wave
   V(t)=10 0≤ t≤ 2 sec
   =-10 2≤t≤4 sec 7M
   b) Determine Fourier transform of the given signal x(t)



7M

OR

8. a) Explain all wave form symmetry by using relevant examples. 7M
   b) Discuss properties of Fourier transforms. 7M

UNIT–V

9. Realize the given impedance function using Cauer form I

$$Z(S)=\frac{(S+4)(S+8)}{(S+2)(S+6)}$$

14M

OR

10. An admittance function is given by

$$Y(S)=\frac{(S+4)(S+6)}{(S+3)(S+5)}$$

Realize the R-L network in second foster form. 14M

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Hall Ticket Number :										

R-17

Code: 7G242

II B.Tech. II Semester Supplementary Examinations April 2023

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	CO	BL
		UNIT–I			
1.	a)	Derive the expression for electric field intensity due to infinite sheet of charge ρ_S C/m^2	8M	1	3
	b)	Derive point form of Maxwell's second equations.	6M	1	3
		OR			
2.	a)	State and explain vector form of Coulombs law.	7M	1	2
	b)	Derive the potential at a point P when a charge q is moving from infinite to point P.	7M	1	3
		UNIT–II			
3.	a)	Define potential gradient and derive the relation between E and V	7M	1	1
	b)	A dipole having moment P = 3ax -5ay +10 a_z nCm is located at Q (1, -2, -4) in the space. Find V at P (2, 3, 4).	7M	1	3
		OR			
4.	a)	Derive the expression for the spherical capacitance.	7M	2	3
	b)	Deduce the boundary conditions for dielectric to dielectric with tangential and normal component.	7M	1	4
		UNIT–III			
5.	a)	Determine an expression for H at (0, 0, h) of a circular wire carrying a current I in clockwise direction. The radius of the circle is 'R' and wire is in X-Y plane.	9M	3	3
	b)	A circular loop located on $X^2+Y^2=9$, z=0 carries a current of 10A along a_Φ. determine H at (0,0,4)	5M	3	3
		OR			
6.	a)	Derive Maxwell's fourth equation in static magnetic field.	7M	3	3
	b)	Derive the expression for magnetic field intensity due to an Infinite conductor carrying a current I Using ampere's circuital law.	7M	3	3
		UNIT–IV			
7.	a)	Evaluate the magnetic force due to a moving point charge in the magnetic field.	7M	3	3
	b)	A negative charge Q= -40nc is moving with a velocity of 6X10^{-6} m/sec in a direction specified by the Unit vector a_v = -0.48a_x-0.6a_y+0.64a_z. Find the magnitude of vector force exerted by the field $\vec{B}$ = 2a_x-3a_y+5a_z T, $\vec{E}$= 2a_x-3a_y+5a_z Kv/m.	7M	3	3
		OR			
8.	a)	Describe the classification of magnetic materials with examples.	7M	4	2
	b)	Derive the expression for magnetic force on a current element in the external magnetic field.	7M	3	3
		UNIT–V			
9.		Explain Faraday's laws of Electromagnetic Induction and Derive the expression for static induced emf and dynamic induced emf.	14M	5	2
		OR			
10.	a)	Explain Faraday's laws of Electromagnetic Induction and Derive the expression for dynamic induced emf.	7M	5	2
	b)	A circular cross section conductor of radius 3 mm carries a current Ic = 5 sin (6 X 108) μA what is the amplitude of the displacement current density if σ = 40 ms/m and ε_r =1.	7M	5	3

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Hall Ticket Number :										

R-17

Code: 7G241

II B.Tech. II Semester Supplementary Examinations April 2023

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) Discuss the effect of variation of frequency and supply voltage on losses in a transformer. 7M

   b) The core of a 100 kVA, 11000/550 V, 1-phase core type transformer has a cross-section of 400 cm^2. Find (i) the number of HV and LV turns per phase and (ii) the e.m.f per turn if the maximum core density is not exceeding 1.3Tesla. Assume a stacking factor of 0.9. What will happen if its primary voltage is increased by 10% on no-load? 7M

OR

2. a) Explain the different types of losses in the transformer. 7M

   b) Derive the EMF equation of a single phase transformer. 7M

UNIT–II

3. a) In OC and SC tests of a transformer, explain why the wattmeter in OC test reads core losses and wattmeter in SC test reads copper losses? 7M

   b) A 100 kVA, 6.6 kV/415V, single phase transformer has an effective impedance of (3 + j10 Ω) referred to h.v side. Estimate full load voltage regulation at 0.8p.f leading and power factor corresponding to the zero voltage regulation? 7M

OR

4. a) With neat circuit diagram explain the of a short circuit test conducted on a transformer. 7M

   b) Derive necessary condition for zero and negative regulation of a transformer. 7M

UNIT–III

5. a) Prove that the load carried by the open delta connection is 0.577 times the original load carried by the delta-Delta connection. 7M

   b) A 400KVA load at 0.7 p.f lagging is supplied by three 1-Ph transformers connected in Delta-Delta. Each of the Delta-Delta transformers is rated at 200KVA, 2300/230V. If one defective transformer is removed from the service, calculate for the Open delta connection: (i) The KVA load carried by each transformer. (ii) Percent rated load carried by each transformer. (iii) Ratio of Open delta bank to Delta-Delta bank ratings. 7M

OR

6. a) Write the advantages of a transformer bank of three 1-Phtransformers. 7M

   b) What is the need of connecting the transformers in parallel? Mentions the conditions for parallel operating of transformers. 7M

UNIT–IV

7. a) Explain, why the speed of 3-phase induction motor cannot be equal to synchronous speed? 4M

   b) A 3-phase, 4-pole, 50 Hz, induction motor has a star connected wound rotor. The rotor emf is 50V between the slip rings at standstill. The rotor resistance and standstill reactance are 0.4Ω and 2Ω respectively. Calculate
   i) Rotor current per phase at starting if 50Ω/ph resistance is connected between slip rings. ii) Rotor current and power factor at full load, when the motor running at 1440 rpm and slip rings are shorted. 10M

OR

8. a) Describe the construction of a 3-phase cage type induction motor with neat sketch. 7M

   b) Explain in detail about torque – slip characteristics. 7M

UNIT–V

9. a) How is the speed of a 3-phase induction motor controlled by its stator voltage control? 6M

   b) A 4-pole induction motor and 6-pole induction motor are connected in cumulative cascade at 50 Hz supply. The frequency in the secondary circuit of the 6-pole motor is observed to be 1.0 Hz. Determine the slip in each machine and combined speed of the set. 8M

OR

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

    b) Explain the induction motor operation under injection of an e.m.f. into the rotor circuit 7M

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