EEE 34

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8029

B.E. / B.Tech. DEGREE END - SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023
Third Semester
Electrical and Electronics Engineering
U19EE307 – DC MACHINES AND TRANSFORMERS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Write the principles of electromechanical energy conversion.	2	K1	CO1
2.	Discuss about MMF of distributed windings in rotating machine.	2	K2	CO1
3.	Give the conditions to be satisfied for voltage buildup in a DC shunt generator.	2	K3	CO2
4.	Define commutation in DC generators.	2	K1	CO2
5.	What are the different methods of speed control in DC motor?	2	K3	CO3
6.	Derive an expression for torque of a DC Motor.	2	K2	CO3
7.	Define the voltage regulation of a transformer.	2	K2	CO4
8.	A single phase transformer has specifications as 250 kVA, 11000 V/415 V, 50 Hz. What are the approximate values of primary and secondary currents?	2	K4	CO4
9.	Write short notes on Brake test of DC Machine.	2	K1	CO5
10.	What is the need of open and short circuit test of transformer?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Derive an expressions of field energy, co-energy and the magnetic force in a singly-excited electro mechanical unit.	13	K3	CO1

(OR)

	b)	For a single excited magnetic system, derive the expression for the magnetic energy stored in terms of reluctance.	13	K3	CO1
12.	a)	Explain armature reaction in DC generator. Also, describe the effect of armature reaction on the operation of D.C machines. How it can be minimized?	13	K2	CO2
		(OR)			
	b)	A DC shunt generator has an induced emf of 254 V. When the generator is loaded, the terminal voltage is 240 V. Neglecting armature reaction, find the load current if the armature resistance is 0.04 ohm and the field circuit resistance is 24 ohms.	13	K4	CO2
13.	a)	Explain the characteristics of DC motors. Also give their applications.	13	K2	CO3
		(OR)			
	b)	Explain why a starter is required for starting a DC motor. Describe a 3-point starter having no-volt and overload protections for starting a DC shunt motor. What modification is made in a 4 point starter?	13	K2	CO3
14.	a)	What are the different losses in a transformer? Derive the condition for maximum efficiency of the transformer.	13	K2	CO4
		(OR)			
	b)	Discuss the essential and desirable conditions to be fulfilled for operating two 3-phase transformers in parallel.	13	K2	CO4
15.	a)	Explain Sumpner's test for testing transformers. Also explain why this is beneficial for finding efficiency of transformers.	13	K2	CO5
		(OR)			
	b)	For a 4 kVA, 200/400 V, 50 Hz, 1 – phase transformer, calculate the efficiency, voltage at the secondary terminals and primary input current when supplying a full – load secondary current at 0.8 lagging power factor. The following are the test results: Open circuit with 200V applied to the L.V. side:0.8A,70W. Short circuit with 20V applied to the H.V. side: 10A, 60W.	13	K5	CO5

PART – C

(1 x 15 = 15Marks)

Q. No.		Questions	Marks	KL	CO
16.	a)	Derive an expression for the torque in a doubly-excited system having salient pole type stator as well as rotor. State the assumptions made.	15	K2	CO1
		(OR)			
	b)	Distinguish single-excited and double-excited systems. For a single excited linear magnetic system, derive the expression for the electromagnetic torque.	15	K2	CO1

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Question Paper Code: 8027

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023
Third Semester
Electrical and Electronics Engineering
U19EE306 – MEASUREMENT AND INSTRUMENTATION
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define accuracy and precision with respect to measurements.	2	K1	CO1
2.	What do you mean by calibration?	2	K2	CO1
3.	Distinguish deflection type instrument from null type instrument.	2	K4	CO2
4.	Write the torque equation for Electrodynamometer type Wattmeter. Comment on the shape of scale if spring control is used.	2	K2	CO2
5.	What are the advantages of digital instruments over analog instrument?	2	K1	CO3
6.	What is the purpose of time base circuit in a CRO?	2	K1	CO3
7.	What is Maxwell's bridge? Derive the equation of balance for the bridge?.	2	K1	CO4
8.	Write the significance of earth resistance tester.	2	K2	CO4
9.	How the flux density is measured?	2	K2	CO5
10.	Mention the electrical phenomenon used in transducers.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	What are the different types of errors? Explain how to eliminate errors in instruments.	13	K3	CO1
		(OR)			
	b)	Discuss in detail various static characteristics of a measurement systems.	13	K2	CO1
12.	a)	Describe the construction and working of a PMMC instrument with a neat and labeled diagram and derive its torque equation.	13	K1	CO2
		(OR)			
	b)	i. The inductance of a moving iron ammeter with full scale deflection of 90° at 1.5A, is given by the expression $L= (200+40\theta-4\theta^2-\theta^3)$ μH, where θ is the deflection in radian from zero position. Estimate the angular deflection of the pointer for a current of 1.0A.	6	K4	CO2
		ii. Explain the construction and working of electrodynamo meter power factor meter.	7	K2	
13.	a)	Draw the block diagram of a general-purpose oscilloscope and explain its working principle.	13	K2	CO3
		(OR)			
	b)	Explain in detail about the various types of recorders.	13	K2	CO3
14.	a)	i. What are the different factors which affect the precision measurement of medium resistances with Wheatstone bridge? Explain how their effects are minimized/eliminated.	7	K4	CO4
		ii. Explain about any one type of inductance bridge with the necessary equation.	6		
		(OR)			
	b)	Describe the ammeter-voltmeter method of measurement of resistances. There are two ways in which the circuit of ammeter voltmeter method can be used i. Ammeter connected to the side of unknown resistance and ii. Voltmeter connected to the side of unknown resistance. Derive the condition which decides which circuit is to be used for a particular set of ammeter voltmeter and unknown resistance.	13	K4	CO4

15. a)	i.	What is LVDT? Explain its working with necessary diagrams and characteristics.	8	K2	CO5
	ii.	Explain the working of piezo electric transducer.	5		
		(OR)			
b)	i.	Explain how a Hall effect transducer is used to measure electric currents with a schematic representation.	6	K2	CO5
	ii.	Explain the working of electric tachometer with a necessary diagrams.	7		

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)		Sketch the DC signal conditioning circuit for pressure measurement using strain gauge. Justify it and explain the working of each component.	15	K4	CO5
		(OR)			
b)	i.	For the parameters accuracy, linearity and range, suggest the name of the temperature transducer to measure human body temperature. Justify it.	8	K4	CO1
	ii.	Identify a digital instrument used to measure the harmonic distortion and explain the working of the same.	7	K3	CO5

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8026

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN.2023

Third Semester

Electrical and Electronics Engineering

U19EE305 – ELECTROMAGNETIC FIELDS

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

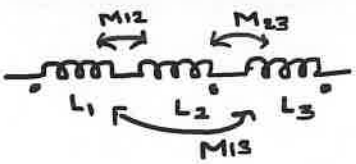
Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Explain divergence theorem with suitable equations.	2	K1	CO1
2.	If A = $(5\hat{x} + 3\hat{y} - 2\hat{z})$ and B = $(-5\hat{x} + 10\hat{y} + 12\hat{z})$, find (A.B) and (AXB)	2	K3	CO1
3.	State Coulomb's law and Gauss's law of electrostatics.	2	K1	CO2
4.	A parallel plate capacitor has its plates separated with a slab of 5 mm thickness and a dielectric constant of 3. If the capacitance is to be made one-fourth of the original value, what should be the new separation between the plates?	2	K2	CO2
5.	Explain Ampere's Circuital Law with an example.	2	K1	CO3
6.	State and explain Biot Savart's Law.	2	K1	CO3
7.	Brief the operation of a transformer using Faraday's Law.	2	K2	CO4
8.	Obtain the expression for effective inductance of the combination shown in the Fig. 1.	2	K3	CO4

Fig. 1



9.	Express the field $A = 15\sin(105t + 3y)\hat{z}$ in phasor form.	2	K3	CO5
10.	Discuss Poynting's Theorem with necessary equations.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	A potential field is described as $V = (5x^2y^3z + x^3z^2 + 5x^2yz^3)$. Find			
		i. Gradient of V at (-1, 5, -2)	6.5	K3	CO1
		ii. Divergence of the gradient of V at (-2, 1, 3)	6.5		
		(OR)			
	b)	Express $D = (21\,\hat{x} - 5\hat{y} - 6\hat{z})$ C/m^2 in			
		i. cylindrical coordinate system	6.5	K3	CO1
		ii. spherical coordinate system	6.5		
12.	a)	The charges and coordinates of two charged particles held fixed in a xy plane are Q1=+4.0 μC, x1=3.0 cm, y1=0.50 cm and Q2=−5.0 μC, x2=−3.0 cm, y2= - 2 cm.			
		i. Find the magnitude and direction of the electrostatic force on Q2.	6.5	K4	CO2
		ii. At what coordinates should a third charge Q3 = - 4.5 μC be placed such that the net electrostatic force on particle 3 due to particles 1 and 2 is zero.	6.5		
		(OR)			
	b)	i. If $E = (5x^2\,\hat{x} + 3y^2\,\hat{y} + 4z^2\,\hat{z})$ V/m, find the potential difference V_{AB}, if A is at (-1, 2, 3) and B is at (6, -1, 2).	6.5	K4	CO2
		ii. If a potential function is $V_k = (3r\cos\theta + 10r - 4r^3\sin\varphi)$ Volts on a dielectric with relative permittivity of 2, find the electric field intensity and electric flux density at $(1, \frac{\pi}{2}, \frac{\pi}{3})$.	6.5		
13.	a)	i. An infinitely long filamentary wire carries current of 1A in +z direction. Calculate the magnetic flux density at (-1,2,1).	6.5	K3	CO3
		ii. Derive the relation between magnetic field intensity and current density using Ampere's Law.	6.5		
		(OR)			
	b)	i. A current carrying conductor lies between (0,1,0) to (1,0,0) carrying a current of 7A. There is another current carrying conductor from origin to (1,0,0) carrying the current of 8A. Find the net magnetic field at (0,2,0) due to these two wires.	6.5	K3	CO3
		ii. Derive the boundary conditions in magnetostatic fields.	6.5		

14.	a)	For two magnetically coupled coils with turns N_1 and N_2 respectively, wound on a magnetic core with $\mu = 3\mu_o$, area of core cross section area A and mean path length l, derive the expression for mutual inductance of each coil and verify whether they are equal.	13	K3	CO4
		(OR)			
	b)	A coaxial cable of length 10 m has an outer radius of 2cm and an inner radius of 1.5cm. Starting from the flux equations, derive the expression for the inductance of the cable.	13	K3	CO4
15.	a)	i. Derive the Maxwell's equation (in point form) relating magnetic field intensity and displacement current.	8	K4	CO5
		ii. Explain the concept of displacement current with necessary equations taking the example of current through a capacitor.	5		
		(OR)			
	b)	For the electric field intensity $\mathbf{E} = E_o \cos(\omega t + \beta z)\hat{y}$ V/m			
		i. Derive (with proper steps) the expression for magnetic field intensity **H**.	8	K4	CO5
		ii. Along which direction is H directed and why?	5		

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	A rectangular core has fixed permeability of $\mu_r >> 1$, a square cross section of dimensions $a \times a$ and has center-line dimensions around its perimeter of b and d. Coils 1 and 2, having turn numbers $N1$ and $N2$ are wound on the core. Consider a selected core cross-sectional plane as lying within the xy plane, such that the surface is defined by $0 < x < a$, $0 < y < a$.			
		i. Find the self-inductance of coil 1.	7.5	K4	CO3
		ii. Find the mutual inductance between coils 1 and 2.	7.5		
		(OR)			
	b)	For a region in free space, electric flux density is found to be $D = \rho_0(z + 2d)\,\hat{z}$ C/m^2 in $(-2d \le z \le 0)$ $-\rho_0(z - 2d)\,\hat{z}$ C/m^2 in $(0 \le z \le 2d)$ Everywhere else, D = 0.			
		i. Using $\nabla . D = \rho_v$, find the volume charge density as a function of position everywhere.	7.5	K4	CO2
		ii. Determine the electric flux that passes through the surface defined by $z = 0$, $-a \le x \le a$, $-b \le y \le b$.	7.5		

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8024

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN.2023

Third Semester

Electrical and Electronics Engineering

U19EE304 – DIGITAL LOGIC CIRCUITS

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Convert binary number 10010110.1001 to decimal and octal number.	2	K2	CO1
2.	Simplify the expression $(X + \overline{Y} + XY)(X + \overline{Y})(\overline{XY})$.	2	K3	CO1
3.	What is the limitation of half adder?	2	K1	CO2
4.	Write the truth table of 1 bit multiplier.	2	K1	CO2
5.	Write the operation of JK flip-flop.	2	K1	CO3
6.	What are the types of shift register?	2	K1	CO3
7.	What are pulse mode circuits?	2	K2	CO4
8.	Prove that the equivalence partition is unique	2	K2	CO4
9.	Why the input variables to a PAL are buffered?	2	K3	CO5
10.	What is programmable logic array? How it differs from ROM?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Minimize the following boolean function F(A, B, C, D) = Σm(1, 3, 4, 6, 8, 9, 11, 13, 15) + Σd(0, 2, 14)	7	K2	CO1
		ii.	Convert binary (111001.1011)2 to decimal, octal and hexadecimal.	6	K1	CO1
			(OR)			
	b)	i.	Minimize the following boolean function F(A, B, C, D) = Σm(0, 2, 8, 10, 14) + Σd(5, 15)	7	K2	CO1
		ii.	Convert decimal $(1345.106)_{10}$ to binary, octal and hexadecimal.	6	K1	CO1
12.	a)		Design a 8421 to gray code converter.	13	K2	CO2
			(OR)			
	b)		Using 8 to 1 multiplexer, realize the Boolean function f(w, x, y, z) = Σ(0,1,2,4,5,7,8,9,12,13).	13	K2	CO2
13.	a)		Realize SR flip flop using NOR gates and explain its operation.	13	K2	CO3
			(OR)			
	b)		Design a four state down counter using T flip flop.	13	K2	CO3
14.	a)		An asynchronous sequential circuit is described by the excitation function $Y = x_1\overline{x_2}\ (x_1 + \overline{x_2})y$ and the output function $z = y$ Draw the logic diagram of the circuit. i. Derive the transition table and output map. ii. Obtain a two-state flow table. iii. Describe in words the behavior of the circuit.	13	K5	CO4
			(OR)			
	b)		An asynchronous sequential circuit has two internal states and one output. The two excitation functions and one output function describing the circuit are, respectively. $Y_1 = x_1x_2 + x_1\overline{y_2} + \overline{x_2}y_1$ $Y_2 = x_2 + x_1\overline{y_1}y_2 + \overline{x_1}y_1$ $z = x_2 + y_1$	13	K4	CO4

i. Draw the logic diagram of the circuit.

ii. Derive the transition table and output map.

iii. Obtain a flow table for the circuit.

15. a) Draw the circuit of a NMOS two input NOR gate and explain its operation. 13 K1 CO5

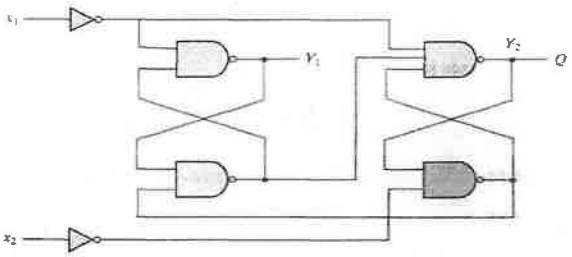
(OR)

b) Draw the ECL circuit and explain its operation clearly. 13 K1 CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	For the asynchronous sequential circuit shown i. Derive the Boolean functions for the outputs of the two SR larches $Y_1$and Y_2. Note that the S input of the second latch is $\overline{x_1 y_1}$. ii. Derive the transition table and output map of the circuit.	15	K4	CO4



(OR)

b) A traffic light is installed at a junction of a railroad and a road. The light is controlled by two switches in the rails placed 1 mile apart on either side of the junction. A switch is turned on when the train is over it and is turned off otherwise. The traffic light changes from green (logic 0) to red (logic 1) when the beginning of the train is 1 mile from the junction. The light changes back to green when the end of the train is 1 mile away from the junction. Assume that the length of the train is less than 2 miles. 15 K3 CO4

i. Obtain a primitive flow table for the circuit.

ii. Show that the flow table can be reduced to four rows.

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Question Paper Code: 2006

B.E./ B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN.2023

Third Semester

Electrical and Electronics Engineering

U19MA303 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to Electronics and Communication Engineering, Biomedical Engineering and Biotechnology)

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State the Dirichlet's conditions that a function $f(x)$ expanded as a Fourier series in $(c, c+2\pi)$.	2	K1	CO2
2.	If $f(x) = kx$ in the interval $(0, 2)$, then find the value of " a_2" in the Fourier series expansions.	2	K2	CO2
3.	Form the partial differential equation by eliminating the arbitrary constants "a"and "b" from $z = ax^3 + by^3$	2	K2	CO1
4.	Find the complete integral of $p + q = x + y$	2	K2	CO1
5.	Write all the possible solutions of the one-dimensional wave equation.	2	K1	CO3
6.	The ends A and B of a rod of length 10 cm long have their temperature kept at 20°C and 70°C. Find the steady state temperature distribution on the rod.	2	K3	CO3
7.	Find the Fourier cosine transform of $2\,e^{-5x} + 5\,e^{-2x}$	2	K2	CO4
8.	Find the Fourier sine transform of $\frac{1}{x}$	2	K3	CO4
9.	Find the Z- transform of $\frac{a^n}{n!}, n \geq 0$.	2	K1	CO5
10.	Find $Z^{-1}\left[\frac{3z}{(z-2)(z-3)}\right]$	2	K2	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i	Find the Fourier series expansion of period $2l$ for the function $f(x) = (l-x)^2$ in the range $(0,2l)$.	10	K2	CO2
		ii	Express $f(x) = x$ in half range cosine series in the range $0 < x < \pi$.	6	K2	CO2
			(OR)			
	b)	i	Fit a Fourier series up to second harmonics by using the following data	10	K2	CO2

x	0	2	4	6	8	10	12
y	9.0	18.2	24.4	27.8	27.5	22.0	9.0

		ii	Expand $f(x) = (x-1)^2, 0 < x < 1$ in a Fourier sine series.	6	K2	CO2
12.	a)	i	Find the general solution of $x(z^2-y^2)p + y(x^2-z^2)q = z(y^2-x^2)$	8	K2	CO1
		ii	Solve $(D^2 + 2DD' + D'^2)z = x^2y + e^{x-y}$	8	K2	CO1
			(OR)			
	b)	i	Solve $p^2 + q^2 = z^2(x^2+y^2)$	8	K2	CO1
		ii	Solve $(D^2 - 3DD' + 2D'^2)z = \sin(x-2y) + e^{2x+3y}$	8	K2	CO1
13.	a)		If a string of length $2l$ is initially at rest in its equilibrium position and each of its points is given the velocity $\left(\frac{\partial y}{\partial t}\right)_{t=0} = k(2lx - x^2),\ 0 < x < 2l.$ Determine the displacement function $y(x,t)$.	16	K4	CO3
			(OR)			
	b)		A rod, 30 cm long has its ends A and B kept at 20°C and 80°C respectively, until steady state conditions prevail. The temperature at each end is suddenly reduced to 0°C and kept so. Find the resulting temperature distribution function $u(x,t)$ taking $x = 0$ at A.	16	K4	CO3
14.	a)		Find the Fourier transform of $f(x) = \begin{cases} 2-\lvert x\rvert, & \lvert x\rvert \le 2 \\ 0, & \lvert x\rvert > 2 \end{cases}$. Hence show that $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{2}$ and $\int_0^\infty \left(\frac{\sin t}{t}\right)^4 dt = \frac{\pi}{3}$.	16	K3	CO4
			(OR)			

b) i Find the Fourier cosine transform of 8 K3 CO4

$$f(x) = \begin{cases} x, & for\ 0 < x < 1 \\ 2 - x, & for\ 1 < x < 2 \\ 0, & for\ x > 2 \end{cases}$$

ii Use transform method, evaluate $\int_0^\infty \frac{dx}{(x^2+9)(x^2+4)}$ 8 K3 CO4

15. a) i Find the Z-transform of $\frac{1}{n(n-1)}$ 8 K2 CO5

ii Find the inverse Z- transform of $\frac{z^2+2z}{z^2+2z+4}$. Using partial fraction method. 8 K2 CO5

(OR)

b) i Using convolution theorem, Find inverse Z- transform of $\frac{z^2}{(z-1)(z-3)}$. 8 K2 CO5

ii Solve the difference equation

$y(n+2) + 4y(n+1) + 4y(n) = n$ given $y_0 = y_1 = 1$ 8 K2 CO5

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8031

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – DEC.2022 / JAN. 2023

Second Semester

Electrical and Electronics Engineering

U19EE202 – ELECTRIC CIRCUIT THEORY

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer All the Questions

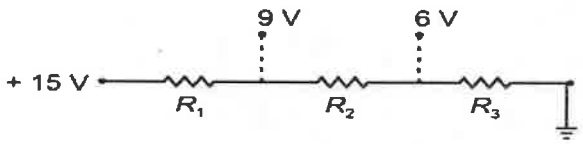
Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Two 50 Ω resistors are connected in series. When a resistor R is connected across one of them, the total circuit resistance is 60 Ω. Calculate the value of R.	2	K4	CO1
2.	A potential divider is used to give outputs of 6V and 9V from a 15V source as shown in Fig:1. Calculate the value of R1, R2 and R3 respectively.	2	K1	CO1
3.	Draw the Thevinin and Norton's equivalent circuits.	2	K1	CO2
4.	Compare star connection and delta connections.	2	K2	CO2
5.	State dot rule for coupled circuits.	2	K1	CO3
6.	List the properties of an ideal transformer.	2	K1	CO3
7.	Determine the value of alternating emf E in the given circuit (Fig.2).	2	K4	CO4

Fig:1



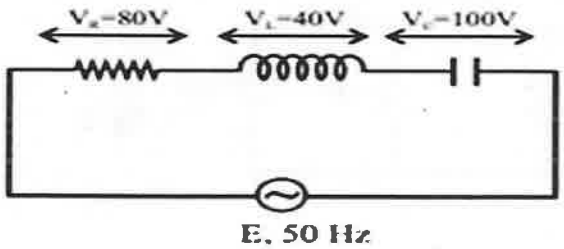


Fig. 2

8.	Show that the load power factor is unity, when two wattmeter readings are equal during power measurement in three phase circuit.	2	K2	CO4
9.	Draw the equivalent circuit of a two port network with the following hybrid parameters matrix. $\begin{bmatrix} V1 \\ I2 \end{bmatrix} = \begin{bmatrix} h11 & h12 \\ h21 & h22 \end{bmatrix} \begin{bmatrix} I1 \\ V2 \end{bmatrix}$	2	K1	CO5
10.	Write the conditions for a two port network to be reciprocal.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11. a)	i.	Determine the current through the circuit shown in Fig:3. Also calculate the power consumed and Power Factor (pf) of the circuit	7	K4	CO1

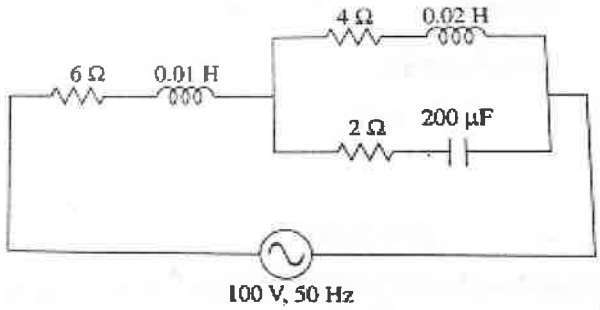


Fig.3.

	ii.	Find the average value, rms value and form factor of the wave shown in Fig.4.	6	K4	CO1

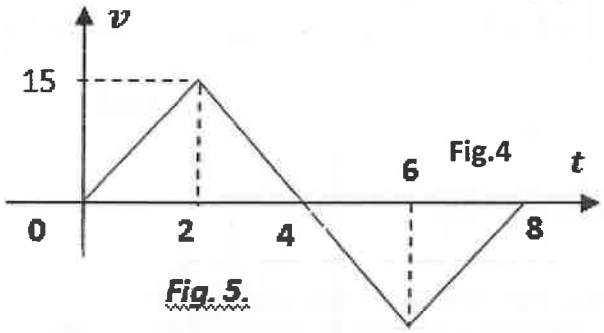


Fig.4

Fig. 5.

(OR)

b)	i.	Determine the current through the 4 Ω resistor of the circuit shown in Fig.5, by mesh analysis.	7	K3	CO1

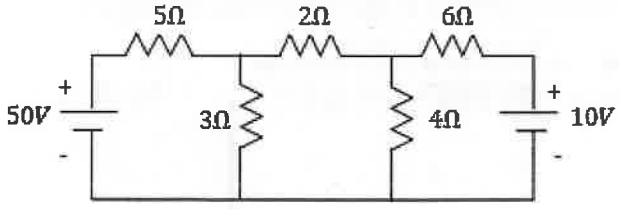


Fig. 5

ii. Calculate the current I in Fig.6, by applying node voltage method. 6 K3 CO1

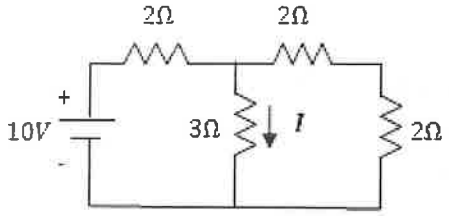


Fig. 6

12. a) i. Find the current through 4 Ω resistor in Fig7. Use source transformation. 7 K4 CO2

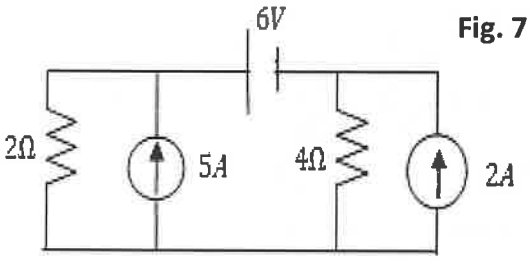


Fig. 7

ii. Verify the reciprocity theorem by finding the current I, inFig.8. 6 K3 CO2

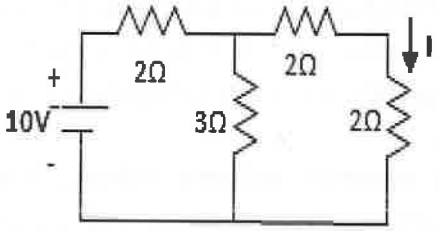
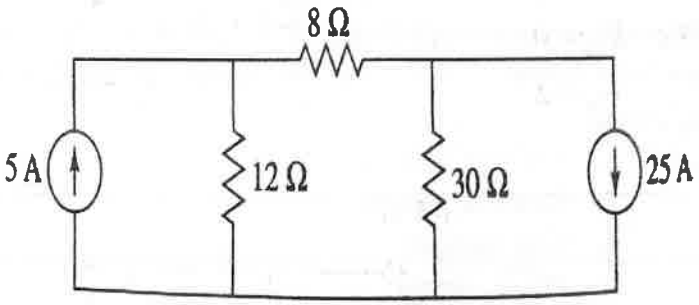


Fig 8.

(OR)

b) i. Using superposition theorem, find the current passing through 8Ω resistor shown in Fig 9. 7 K3 CO2

Fig 9.



ii. For Fig.10 determine the value of R_L for maximum power transfer. Also find the power. 6 K3 CO2

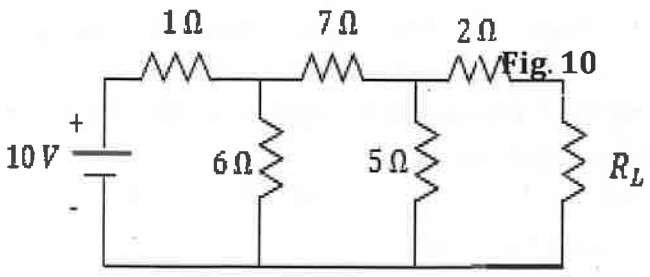


Fig. 10

13. a)	i.	Show that for a series RLC circuit $\omega_1\omega_2 = \omega_r^2$, where $\omega_1 and \omega_2$ are the half-power frequencies and ω_r is resonant frequency.	7	K3	CO3
	ii.	Derive the expression $M = k\sqrt{L_1L_2}$ for coupled circuits.	6	K3	CO3
		(OR)			
b)	i.	For the coupled circuit shown in Fig.11, find the currents I_1 and I_2.	7	K4	CO3

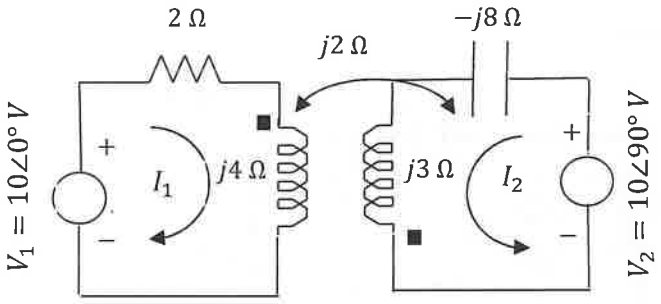


Fig. 11

	ii.	A coil has a resistance of 20 Ω and inductance of 80 mH and is connected in series with a 100 μF capacitor. Determine the resonant frequency, Q-factor, half-power frequencies, and Band width (BW).	6	K4	CO3
14. a)	i.	Explain the relations between voltage, current and power relations in a balanced star network with a phaser diagram.	7	K3	CO4
	ii.	Specify the reasons for having the electric power generation, transmission and distribution as three phase system with neutral.	6	K2	CO4
		(OR)			
b)	i.	Three phase equal impedances of 8 + j10 ohms are connected in star to a 3-phase, 440V, 50 Hz supply source. Calculate the following. 1. Active power. 2. Reactive power. 3. Line current. 4. Phase current.	7	K4	CO4
	ii.	Determine power factor of the balanced load in which two wattmeter readings are 2000 watts and 500 watts 1. When the both watt meter readings are positive. 2. When the 500 watts wattmeter reading obtained after reversing the current coil of the meter.	6	K3	CO4
15. a)	i.	Find the Z parameters for the test results of a two port network given as follows. 1. $I_1 = 0.1\angle 0°$A, $V_1 = 5.2\angle 50°$ V, $V_2 = 4.1\angle -25°$V with port-2 open circuited and	7	K3	CO5

2. $I_2 = 0.1 \angle 0°A$, $V_1 = 3.1 \angle -80°$ V, $V_2 = 4.2 \angle 60°$V with port-1 open circuited.

ii. Find the transmission parameters for the network shown in Fig: 12. 6 K3 CO5

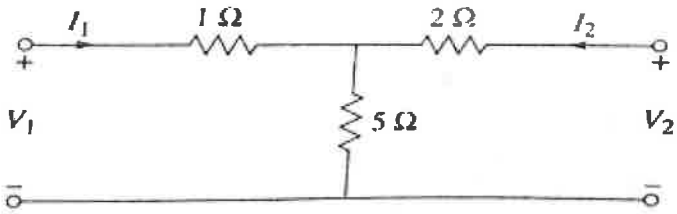


Fig:12

(OR)

b) Explain the transmission parameter and inverse transmission parameter representation for the cascade inter connection of two ports and obtain the ABCD and A' B' C' D' matrices. 13 K3 CO5

PART – C

(1 x 15= 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Find Z-parameters for the network shown in Fig.13. Find Y and h parameters	15	K3	CO5

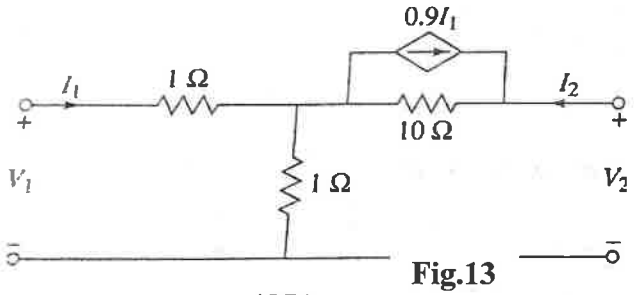


Fig.13

(OR)

b) Draw the delta and star circuits and derive the expression for transforming from one to another as equivalent. 15 K3 CO2