Hall Ticket Number :										

R-19

Code: 19A243T

II B.Tech. II Semester Supplementary Examinations December 2022

Generation and Transmission of Electric Power

(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.		What are the factors which affect the location of site of a hydroelectric power plant	14M	CO1	L1
		OR			
2.		Draw and explain single line diagram of hydro plant.	14M	CO1	L1
		UNIT–II			
3.		Derive the expression for capacitance of a 3-phase overhead line for symmetrical and unsymmetrical spacing.	14M	CO2	L2
		OR			
4.	a)	Find out capacitance of a single phase line 30 km long consisting of two parallel wires each 15 mm diameter and 1.5 m apart.	7M	CO2	L3
	b)	Determine the inductance per phase per km of a double circuit 3-phase line .The radius of each conductor is 20 mm and the conductors are placed on the circumference of an imaginary circle of radius 7 m forming a regular hexagonal figure.	7M	CO2	L3
		UNIT–III			
5.		Distinguish between short, medium and long transmission line with vector diagram.	14M	CO3	L2
		OR			
6.		Derive an expression for voltage regulation of a short transmission line with vector diagram.	14M	CO3	L2
		UNIT–IV			
7.		Explain Ferranti effect and proximity effect.	14M	CO4	L2
		OR			
8.		A transmission line has a span of 275 m between level supports. The conductor has an effective diameter of 1·96 cm and weighs 0·865 kg/m. Its ultimate strength is 8060 kg. If the conductor has ice coating of radial thickness 1·27 cm and is subjected to a wind pressure of 3·9 gm/ cm2 of projected area, calculate sag for a safety factor of 2. Weight of 1 c.c. of ice is 0·91 gm.	14M	CO4	L3
		UNIT–V			
9.		The insulation resistance of a single-core cable is 495 M_ per km. If the core diameter is 2·5 cm and resistivity of insulation is $4{\cdot}5\times 10^{14}$ ohm-cm, find the insulation thickness.	14M	CO5	L3
		OR			
10.		A 66-kV single-core lead sheathed cable is graded by using two dielectrics of relative permittivity 5 and 3 respectively; thickness of each being 1 cm. The core diameter is 2 cm. Determine the maximum stress in the two dielectrics.	14M	CO5	L3

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Hall Ticket Number :										

R-19

Code: 19A244T

II B.Tech. II Semester Supplementary Examinations December 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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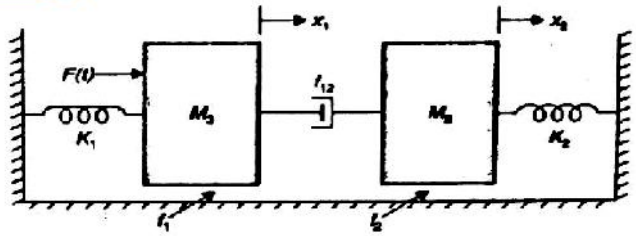
			Marks	CO	BL
		UNIT–I			
1.	a)	Write the differential equations for the given mechanical system. Also obtain an analogous electrical circuit based on force- current analogy. 	8M	1	2
	b)	Derive the transfer function of an AC servo motor	6M	1	2
		OR			
2.	a)	Explain the properties of Signal Flow Graph	7M	1	1
	b)	Explain about Synchros with figures	7M	1	1
		UNIT–II			
3.		Derive the time domain specifications of a second order system	14M	2	1
		OR			
4.		Define Transfer Function, Characteristic equation, Poles, Zeros, Type & Order of a System with examples.	14M	2	1
		UNIT–III			
5.		A unity feedback control system has an open loop transfer function of $G(s) = K/s(s^2+4s+3)$. Sketch the root locus	14M	3	2
		OR			
6.	a)	By Routh stability criterion determine the stability of the system represented by characteristics equation $9S^5-20S^4+10S^3-S^2-9S-10=0$. Comment on the location of characteristic equation.	10M	3	2
	b)	Define stability of a control system	4M	3	1
		UNIT–IV			
7.		Plot the bode diagram for the transfer function $G(S) = K/S(1+0.4S)(1+0.1S)$. Also obtain the gain and phase cross over frequencies	14M	3	2
		OR			
8.		The open loop transfer function of a unity feedback system is given by $G(s) = K/S(S+2)(S+1)$. Sketch the Polar plot and Determine gain margin and phase margin	14M	3	2
		UNIT–V			
9.		Design a lead compensator for a system with transfer function $G(s) = K/s^2(1+0.1s)$ for the specifications: acceleration error constant K_a=10 and phase margin $\phi^{PM} = 36^o$	14M	4	2
		OR			
10.	a)	Define Observability and explain with an Example	7M	4	2
	b)	Define Controllability and explain with an Example	7M	4	2

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Hall Ticket Number :										

R-19

Code: 19AC44T

II B.Tech. II Semester Supplementary Examinations December 2022

Life Sciences for Engineers

(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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UNIT–I

1. Describe the cellular basis of life?

OR

2. a) Explain the kingdom of Animalia?
   b) Describe the functions of Lysomes?

UNIT–II

3. Describe the mechanism of enzyme action?

OR

4. Describe the enzymes and write the importance of enzymes?

UNIT–III

5. Explain the reaction of Electron Transport Chain?

OR

6. a) Explain respiration and types of respiration?
   b) Explain the Oxidative phosphorylation?

UNIT–IV

7. a) Briefly describe the transcription and translation?
   b) Write the importance of Genetic code?

OR

8. Discuss the Gene Mapping?

UNIT–V

9. Describe the **DNA Microarray technique**, types and applications?

OR

10. a) Explain the Importance of DNA Cloning?
    b) Describe the types of Biosensors?

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Hall Ticket Number :										

R-19

Code: 19A245T

II B.Tech. II Semester Supplementary Examinations December 2022

Network Analysis and Synthesis

(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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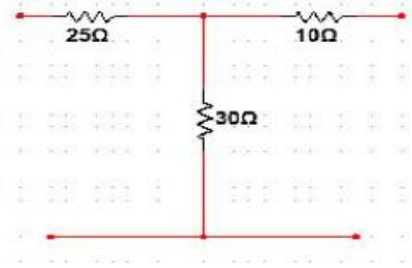
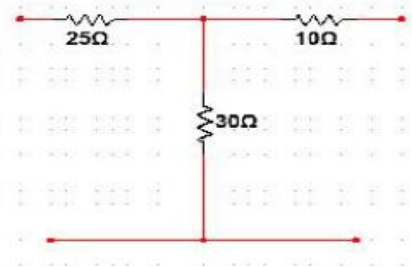
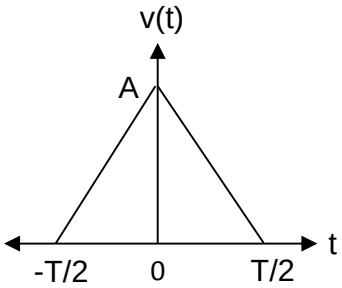
			Marks	CO	BL
		UNIT–I			
1.	a)	Explain the Y-parameters of the Two-Port Network.	7M	CO1	L2
	b)	Determine the Y-parameters of the Two-Port Network shown below. 	7M	CO1	L3
		OR			
2.	a)	Explain the ABCD-parameters of the Two-Port Network.	7M	CO1	L2
	b)	Determine the ABCD-parameters of the Two-Port Network shown below. 	7M	CO1	L3
		UNIT–II			
3.	a)	Determine the Laplace transform of the following functions. (i) f (t) = $(4t^3+t^2-6t+7)$ ii) f (t) = $\frac{(2-2e^{-2t})}{t}$	7M	CO2	L3
	b)	Determine the Laplace transform of the non-periodic square wave of amplitude 'A' and time period of 'T'sec.	7M	CO2	L3
		OR			
4.		Develop the step response of RC series circuit using Laplace Transform approach.	14M	CO2	L3
		UNIT–III			
5.	a)	Develop the dc transient response of RL series circuit using classical differential equation solvation approach.	7M	CO3	L6
	b)	A series RL circuit with R=20Ω and L=10H has a constant voltage V=50v applied at t=0. Determine the expression for the current i(t) using classical differential equation approach.	7M	CO3	L3
		OR			

6.	a)	Develop the transient response of RC series circuit for sinusoidal excitation using classical differential equation solvation approach.	7M	CO3	L6
	b)	A Series RC circuit with R= 5Ω and C= 0.01μf, has a sinusoidal voltage v(t) = 100 sin1000t applied at t=0. Determine the current i(t) for t>0 using classical differential equation approach.	7M	CO3	L3

UNIT–IV

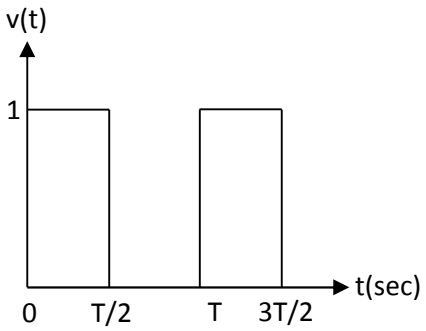
7.	a)	Determine the Fourier transform of the following functions (i) f(t) = sgn(t) (ii) f(t) = A (where 'A' is constant)	7M	CO4	L3
	b)	Determine the Fourier Transform of the waveform shown below.			



7M CO4 L3

OR

8.	a)	Determine the trigonometric Fourier series expansion of the waveform shown below.			



7M CO4 L3

	b)	Determine the impedance, power and power factor whose expression for voltage and current are given as: v(t) = (100 sin(ωt+60°) - 50 sin(3ωt-30°)) V i(t) = (10 sin(ωt+60°) + 50 cos(3ωt+60°)) A	7M	CO4	L3

UNIT–V

9.	a)	List out the necessary conditions for a Transfer function?	7M	CO5	L1
	b)	Draw the pole-zero diagram of the following driving point impedance function. $Z(s) = \frac{s^2 - 7s + 10}{s^2 + s + 50}$	7M	CO5	L4

OR

10.	a)	Determine the Foster form-I realization for the following function $Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$	7M	CO5	L3
	b)	Determine the Cauer form-I realization for the following function $Z(s) = \frac{s(s^2 + 3)(s^2 + 5)}{(s^2 + 2)(s^2 + 4)}$	7M	CO5	L3

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Hall Ticket Number :										

R-19

Code: 19AC42T

II B.Tech. II Semester Supplementary Examinations December 2022

Numerical Methods and Transform Techniques

(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	CO	BL
	UNIT–I			
1. a)	Find the real root of $x - \cos x = 0$ by Newton Raphson Method.	7M	1	1
b)	Find y at $x = 21$ from the following data			

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

7M 1 1

OR

2. Calculate y(160) and y(390) from the following data

x	100	150	200	250	300	350	400
y	10.63	13.03	15.04	16.81	18.42	19.90	21.27

14M 1 3

UNIT–II

3. Compute y(0.1), y(0.2), y(0.3) from $y' = x - y^2$, $y(0) = 1$using Taylor series method. 14M 2 3

OR

4. Apply Runge Kutta Fourth order method to find the value of y when x=0.2 given that $\frac{dy}{dx} = x + y^2$,y=1 when x=0 14M 2 3

UNIT–III

5. Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and the residues at each pole. 14M 3 3

OR

6. Find $\int_c \frac{e^{2z}}{(z-1)(z-2)} dz$ where $c : |z| = 3$ 14M 3 4

UNIT–IV

7. a) Express $f(x)=\begin{cases}1, 0\le x\le ®\\ 0, x>®\end{cases}$ as a Fourier sine integral and hence evaluate $\int_0^{\infty}\frac{1-\cos(®a)}{a}\sin(xa)da$ — 7M — 4 — 2

   b) Show that $F_s\{xf(x)\}=-\frac{d}{ds}F_c(s)$ and $F_c\{xf(x)\}=\frac{d}{ds}F_s(s)$ — 7M — 4 — 2

OR

8. Find the Fourier Cosine transform of $f(x)=\frac{1}{1+x^2}$ — 14M — 4 — 1

UNIT–V

9. a) Find Z((n+1)^2) — 7M — 5 — 1
   b) Find Z(cosn^{-}) — 7M — 5 — 1

OR

10. a) Find Z(sin(3n+5)) — 7M — 5 — 1

    b) Find Z transform of $3n-4\sin\frac{n®}{4}+5a$ — 7M — 5 — 1

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Hall Ticket Number :										

R-19

Code: 19A242T

II B.Tech. II Semester Supplementary Examinations December 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	CO	BL
		UNIT–I			
1.	a)	State and explain vector form of Coulombs law.	7M	1	2
	b)	Three charges of 5μC, 8μC and 10μC are placed at P_1 (2, -3, 4), P_2 (2, 3, 4) and origin respectively. Find the force on the charge at origin.	7M	1	3
		OR			
2.	a)	Determine the electric field intensity E at (6,8, -10) caused by a i) Point charge 50μC at origin ii) An infinite line charge 40μC along z-axis.	10M	1	3
	b)	Define potential and potential difference	4M	1	1
		UNIT–II			
3.		Derive the expression for potential at a point 'p' due to electric dipole and also extend the derivation for electric field intensity due to electric dipole.	14M	1	3
		OR			
4.	a)	Deduce the boundary conditions for dielectric to conductor with tangential and normal component.	7M	1	4
	b)	Explain Polarization of dielectric materials.	7M	2	2
		UNIT–III			
5.	a)	State and explain Biot-savart's law.	7M	3	2
	b)	Using Biot-savart law, evaluate an expression for the magnetic field intensity in the vicinity of a straight current carrying conductor of finite length.	7M	3	3
		OR			
6.	a)	Derive Maxwell's equation $\nabla X H = J$	8M	3	3
	b)	Define Magnetic flux, Magnetic flux density, MFI and give the relationship between B and H.	6M	3	1
		UNIT–IV			
7.		Derive an expression for the force between parallel wire carrying a current in (i) the same direction. (ii) opposite direction	14M	3	3
		OR			
8.	a)	Develop expression for inductance of solenoid.	7M	3	4
	b)	Write a short note on magnetization.	7M	4	1
		UNIT–V			
9.	a)	Explain the terms (i)Motional EMF and (ii)Static EMF	7M	5	2
	b)	Describe the significance of Displacement current.	7M	5	1
		OR			
10.	a)	Derive the integral and point form of time varying Maxwell equation from Gauss law.	8M	5	3
	b)	A single turn rectangular loop of enclosed area 2sqm is situated in air with its plane normal to the Magnetic field which weighs at a rate of 2wb/m^2sec. Estimate emf induced in the loop.	6M	5	3

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Hall Ticket Number :										

R-19

Code: 19A241T

II B.Tech. II Semester Supplementary Examinations December 2022

Electrical Machines-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	CO	BL
		UNIT–I			
1.	a)	Explain in detail about torque – slip characteristics.	8M	1	2
	b)	The power input to the rotor of 440V, 50 Hz, 6 pole, 3-phase, and induction motor is 80KW. The rotor electromotive force is observed to make 100 complete alterations per minute. Calculate (i) the slip (ii) the rotor speed (iii) rotor copper losses per phase.	6M	1	3
		OR			
2.	a)	Write short note on (i) Double cage rotor (ii) Deep bar rotor	7M	1	1
	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 rotor current per phase at starting if 50Ω/ph resistance is connected between slip rings.	7M	1	3
		UNIT–II			
3.	a)	Explain the induction motor operation under injection of an e.m.f. into the rotor circuit	7M	1	2
	b)	A cascade set consists of two motor A and B with 4 and 6 poles respectively. The motor A is connected to 50Hz supply. Find (i) The speed of the set, (ii) The power transferred to motor B when the input to the motor A is 25KW.	7M	2	2
		OR			
4.	a)	Explain the working principle of Induction generator.	7M	2	1
	b)	Explain the conducting procedure of Blocked rotor test on three phase induction motor.	7M	1	2
		UNIT–III			
5.		Write a short note on (i) Capacitor Start Induction motor (ii) Capacitor Start-Run Induction motor	14M	2	2
		OR			
6.		Discuss the working of 1-Ph induction motor. Using double field revolving theory, prove that the 1-Ph induction motor is not self-starting motor.	14M	2	2
		UNIT–IV			
7.	a)	Compare the salient features of projecting pole rotor and round rotor.	8M	1	1
	b)	Find the pitch factor for the winding of 36 slots, 4 poles, coil span 1 to 8.	6M	1	2
		OR			
8.	a)	Explain in detail about the constructional features of round rotor synchronous machines.	7M	2	2
	b)	An alternator has 18 slots/pole and first coil lies in slots 1 and 16. Calculate the pitch factor for (i) Fundamental (ii) 3^{rd} harmonics (iii) 5^{th} harmonics	7M	4	3
		UNIT–V			
9.	a)	What is an infinite bus? Mention the conditions to be satisfied prior to synchronizing an alternator to infinite bus bar.	6M	6M	1
	b)	A 10MVA 3-ph alternator has a reactance of 20%. Calculate the total synchronizing power of armature per mechanical degree of phase displacement when running in parallel on 10KV, 50Hz bus at 1500rpm.	8M	6M	3
		OR			
10.		Two single phase alternators operate in parallel and supply a load impedance of (3 + j4) Ω/ph. If the impedance is (0.2 + j2) Ω/ph, e.m.f.s are (220 + j0) V, determine (i) Terminal voltage, (ii) p.f and output power of each machine.	14M	6M	3

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