Hall Ticket Number :										

R-19

Code: 19A242T

II B.Tech. II Semester Regular Examinations August 2021

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	Blooms Level
		UNIT–I			
1.	a)	Two point charges of 1mC and -2mC are located at (3, 2, -1) and (-1, -1, 4), respectively. Calculate the electric force on a 10nC charge located at (0, 3, 1).	7M	CO1	L3
	b)	Derive the expression for Electric Field Intensity due to an infinite line charge?	7M	CO1	L3
		OR			
2.	a)	State and explain point form of Maxwell's I Equation?	7M	CO1	L3
	b)	Derive the expression of energy in a moving point charge in an electric field?	7M	CO1	L3
		UNIT–II			
3.	a)	Derive the expression for energy density in electrostatic fields?	7M	CO2	L1
	b)	Derive the expression for torque on an electric dipole in an electric field?	7M	CO2	L1
		OR			
4.	a)	Describe briefly about polarization in dielectric materials?	7M	CO2	L1
	b)	Derive the expression of the capacitance of a parallel plate capacitor with composite dielectric?	7M	CO2	L1
		UNIT–III			
5.	a)	State and explain Biot-Savart's Law?	7M	CO3	L3
	b)	Using ampere's circuital law Find the expression for magnetic field intensity of an infinite sheet of current?	7M	CO3	L3
		OR			
6.	a)	Derive and explain Maxwell's Third equation?	10M	CO3	L3
	b)	Define scalar magnetic potential and list out its limitations.	4M	CO3	L3
		UNIT–IV			
7.	a)	If a point charge of 4C moves with a velocity of $5a_x+6a_y-7a_z$ m/s, find the force exerted, if the flux density is $5a_x+7a_y+9a_z$ wb/m^2.	7M	CO4	L1
	b)	Derive an expression for force between two straight and parallel current carrying conductors in same direction?	7M	CO4	L1
		OR			
8.	a)	Derive the expression for torque on a current loop placed in a magnetic field?	7M	CO4	L1
	b)	Calculate the inductance of a solenoid of 200 turns wound tightly on a cylindrical tube of 6cm diameter. The length of the tube is 60cm and the solenoid is in the air.	7M	CO4	L1
		UNIT–V			
9.	a)	Describe in detail about statically and dynamically induced emf's?	7M	CO5	L3
	b)	Derive the expression for modified Maxwell's I equation for time varying fields.	7M	CO5	L3
		OR			
10.	a)	A parallel plate capacitor with a parallel plate area of 5cm^2 and plate separation of 3mm has a voltage of 50 sin 10^3t volts applied to its plates. Calculate the displacement current assuming $\varepsilon=2\varepsilon_o$.	7M	CO5	L3
	b)	State and explain Poynting theorem? What is the significance of Poynting Vector?	7M	CO5	L3

END

Hall Ticket Number :										

R-19

Code: 19A241T

II B.Tech. II Semester Regular Examinations August 2021

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	Blooms Level
		UNIT–I			
1.	a)	The power supplied to a 3-phase induction motor is 40 kW and the corresponding stator losses are 1.5 kW. Calculate (i) the total mechanical power developed and the rotor copper loss when the slip is 0.04 per unit and (ii) efficiency of the motor (neglecting the rotor iron loss).	7M	4	3
	b)	Derive the condition for maximum torque of a 3-phase induction motor under running condition.	7M	1	1
		OR			
2.	a)	Explain the construction and working of a 3-phase induction motor.	8M	1	1
	b)	What are the various losses in an induction motor? On what factors do they depend?	6M	1	1
		UNIT–II			
3.	a)	Explain the cascade arrangement for controlling speed of 3 phase induction motors.	8M	2	4
	b)	Compare star/delta and autotransformer methods of starting induction motors.	6M	2	4
		OR			
4.	a)	How Speed of induction motor is controlled by changing its frequency and no.of poles? Explain any one method in each case with neat sketches.	8M	3	4
	b)	What are the limitations of various starting methods?	6M	2	4
		UNIT–III			
5.	a)	Indicate the slip torque characteristics of different types of single-phase induction motors in one diagram and compare. State the reasons for their deviation.	7M	1	1
	b)	Why a single winding single phase induction motor does not have starting torque?	7M	6	4
		OR			
6.	a)	Explain the operation of single-phase induction motor using split phase technique.	8M	1	1
	b)	Mention the advantages, disadvantages and applications of various single-phase induction motors.	6M	1	1
		UNIT–IV			
7.	a)	Explain the effect of armature reaction on the operation of synchronous generator.	6M	2	4
	b)	What are the different types of ac generators in use? Explain the essential differences in their construction.	8M	1	1
		OR			
8.	a)	Describe the slip test method for the measurement of Xd and Xq of synchronous machines.	8M	1	1
	b)	A 5kVA, 240 V, star connected, 3 phase salient pole alternator with direct axis and quadrature axis synchronous reactance of 12Ω and 7Ω respectively delivers full load current at unity pf. Calculate the excitation voltage and reactance power.	6M	4	3
		UNIT–V			
9.	a)	Explain what is meant by synchronizing of alternators. What are the various methods of synchronizing?	8M	4	1
	b)	What is an infinite bus? Mention three conditions to be satisfied prior to synchronizing an alternator to an infinite bus.	6M	1	1
		OR			
10.	a)	What is meant by hunting and how to prevent hunting in a synchronous motor?	7M	2	4
	b)	Explain how a synchronous motor can be operated as a synchronous condenser.	7M	3	3

END

Hall Ticket Number :										

R-19

Code: 19A243T

II B.Tech. II Semester Regular Examinations August 2021

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	Blooms Level
		UNIT–I			
1.	a)	Discuss in detail about the classification of Nuclear reactors.	7M	1	1
	b)	List out the advantages and disadvantages of thermal power station.	7M	1	1
		OR			
2.	a)	Discuss about the various parts of Hydro power station with neat diagram	7M	1	1
	b)	Write short notes on differences between thermal and nuclear power stations.	7M	1	1
		UNIT–II			
3.	a)	Derive an expression for the inductance of a double circuit line whose conductors are placed at the vertices of a regular hexagon.	7M	2	2
	b)	A 3-phase 132kV, 100km, 50Hz, single circuit line has horizontal spacing with 3.5m between adjacent conductors. The conductor diameter is 1.2cm. find the line capacitance per phase and charging current per phase.	7M	2	3
		OR			
4.	a)	A 3-phase transposed line has conductors of diameter 2cm and spaced at distance of 3.65, 5.5 and 8.2 m between the centers. Calculate the inductance per phase per km of line length.	7M	2	3
	b)	Derive an expression for the capacitance between conductors of a single phase line. Deduce the expression for line to neutral capacitance.	7M	2	2
		UNIT–III			
5.	a)	A 150 km long overhead line has a resistance of 48.7 ohms per phase per km, inductive reactance of 80.20 ohms per phase per km and capacitance (line to neutral) 8.42 nF per km. It supplies a load of 13.5 MW at a voltage of 88 kV and power factor 0.9 lagging. Using nominal T circuit, find the sending end voltage, current, regulation and power angle.	7M	3	3
	b)	Draw the phasor diagram of a short line and derive an expression for voltage regulation.	7M	3	2
		OR			
6.		Starting from the principles deduce expressions for ABCD constants of a long line in terms of its parameters. Define propagation constant and characteristic impedance.	14M	3	2
		UNIT–IV			
7.	a)	Briefly explain skin and proximity effects.	7M	4	1
	b)	A string has 4 suspension discs. The capacitance between each unit and earth is one-fifth of the mutual capacitance: (i) Find the voltages across different discs as percent of total string voltage (ii) Also find string efficiency.	7M	4	3
		OR			
8.	a)	Define and derive the expressions for disruptive critical voltage and visual critical voltage.	7M	4	2
	b)	Derive the expression for sag with unequal supports.	7M	4	2
		UNIT–V			
9.	a)	Define grading and discuss different grading methods.	7M	5	1
	b)	In detail discuss various types of insulation materials.	7M	5	1
		OR			
10.	a)	Draw the cross-section of a 3-core belted cable. Discuss the function of each part.	7M	5	2
	b)	How are cables classified? Give the application of each type of cable.	7M	5	1

END

Hall Ticket Number :										

R-19

Code: 19A244T

II B.Tech. II Semester Regular Examinations August 2021

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)

Use of rectangular graphs, semi log sheets and polar graphs are permitted

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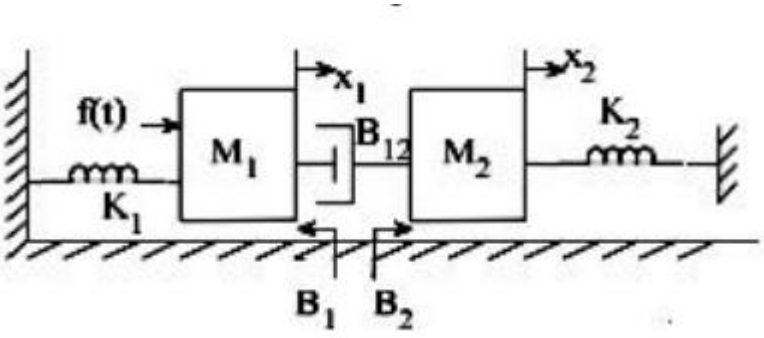
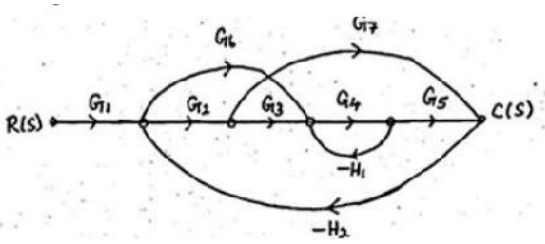
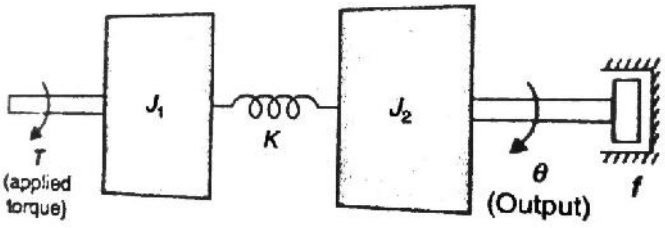
			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Define open loop and closed loop systems. Explain advantages and disadvantages of open loop and closed loop systems.	6M	1	1
	b)	For the mechanical system shown below, derive the transfer function f(s) / $X_1(s)$ 	8 M	1	2
		OR			
2.	a)	Deduce the transfer function using Mason's gain formula 	8M	1	2
	b)	Deduce the differential equations governing the given mechanical system 	6M	1	2
		UNIT–II			
3.		Derive the time domain specifications of a second order system with a unit step input	14M	2	1
		OR			
4.		A unity feedback system is characterized by the open loop transfer function G(s) = 1/s*(0.5s+1) (0.2s+1). Determine the steady state error for unit step, unit ramp and unit acceleration inputs.	14M	2	1

UNIT–III

5.	a)	Define stability of a control system and explain about characteristic equation.	4M	2	1
	b)	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	2	2

OR

6.		Sketch the root locus of the system whose open loop transfer function is $G(S) = \frac{K}{S(S+2)(S+4)}$ Find the value of K so that the damping ratio of the closed loop system is 0.5	14M	3	2

UNIT–IV

7.		The open loop transfer function of a unity feedback system is given by $G(S) = \frac{1}{S(S+1)(S+2)}$. Sketch the Polar plot and Determine gain margin and phase margin	14M	3	2

OR

8.		The open loop transfer function of a unity feedback system is given by G(s) = k / [s*(1+0.2s) (1+0.05s)]. Draw the bode plot. From the graph i) Determine the value of k for the given gain margin of 10 dB and find the corresponding phase margin ii) Determine the value of k for the given phase margin of 40^o and find the corresponding gain margin	14M	2	1

UNIT–V

9.		Design the basic lead compensator using Bode plot	14M	2	1

OR

10.	a)	A continuous time system has a transfer function of $T(s) = (s^2+3s+3) / (s^3+2s^2+3s+1)$. Construct a state model of the system	8 M	4	2
	b)	What do you understand by state transition matrix? State and prove its properties	6 M	4	1

END

Hall Ticket Number :										

R-19

Code: 19AC44T

II B.Tech. II Semester Regular Examinations August 2021

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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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Describe the cellular basis of life with suitable examples?	7M	1	2
	b)	How organisms are classified based on carbon and energy sources?	7M	1	1
		OR			
2.		What are prokaryotes and eukaryotes? Explain in detail about the differences between prokaryotes and eukaryotes?	14M	1	3
		UNIT–II			
3.		Explain the structure and functions of proteins with suitable examples?	14M	2	2
		OR			
4.	a)	What is fermentation? Describe the industrial applications of fermentation?	7M	2	1
	b)	What are antibodies and add a note on its structure?	7M	2	1
		UNIT–III			
5.		Explain about the tricarboxylic acid (TCA) cycle?	14M	3	2
		OR			
6.	a)	Explain the enzymatic steps involved in glycolysis?	7M	3	1
	b)	Write about synaptic and neuromuscular junctions?	7M	3	2
		UNIT–IV			
7.		What are the steps involved in DNA replication of eukaryotes?	14M	4	2
		OR			
8.		Explain the process of transcription and translation in eukaryotes?	14M	4	3
		UNIT–V			
9.	a)	Describe the salient features of restriction endonucleases?	7M	5	1
	b)	Explain the production of recombinant vaccines?	7M	5	2
		OR			
10.		Explain the various process of recombinant DNA technology?	14M	5	2

END

Hall Ticket Number :										

R-19

Code: 19AC42T

II B.Tech. II Semester Regular Examinations August 2021

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	Blooms Level
		UNIT–I			
1.	a)	Determine a real root of $x e^x = 3$ using Regula – Falsi method.	7M	1	3
	b)	Determine a root correct to three decimal places for the equation $x^3–x–2=0$ using Newton Raphson method.	7M	1	3
		OR			
2.	a)	The population of a certain town is shown in the following table Year X: 1931, 1941, 1951, 1961, 1971 Population Y: 40.62, 60.80, 79.95, 103.56, 132.65 Determine the population in 1981.	7M	1	3
	b)	Using Lagrange's formula, calculate $f(3)$ from the following table x: 0, 1, 2, 4, 5, 6 f(x): 1, 14, 15, 5, 6, 19	7M	1	3
		UNIT–II			
3.	a)	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Trapezoidal rule and Simpson one third rule.	7M	2	5
	b)	Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta$ using Simpson's $\frac{3}{8}$ rule taking 6 equal intervals.	7M	2	5
		OR			
4.	a)	Using Taylor's series, determine y at $x = 0.1$ and $x = 0.2$ given $\frac{dy}{dx} - 2y = 3e^x, y(x) = 0. y(0) = 0$	7M	2	3
	b)	Using the fourth order Runge-Kutta method to determine $y(0.1)$, given $y' = xy + y^2, y(0) = 1.$	7M	2	3
		UNIT–III			
5.	a)	Determine the Taylor's series to represent the function f(z) = sin z about $z = -\pi/2$	7M	3	3
	b)	Determine the Laurent series expansion of the function $f(z) = \frac{7z-2}{(z+1)(z)(z-2)}$ in the region 1<|z+1|<3	7M	3	3
		OR			
6.	a)	Determine the residue at each pole of the function $f(z) = \frac{z^2-2z}{(z+1)^2(z^2+1)}$	7M	3	3

b) Evaluate $\oint_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle given by (i) |z|=1 (ii) |z+1-i|=2 using residue theorem. 7M 3 5

UNIT–IV

7. a) Determine Fourier transform of f(x) defined by f(x) = $e^{-x^2/2}$, $-\infty < x < \infty$ or show that the Fourier transform of $e^{-x^2/2}$ is self reciprocal. 7M 4 3

b) Using Fourier transform of that pro
r integral, show $\int_0^{\infty} \frac{1-\cos\pi\lambda}{\lambda} \sin x\lambda d\lambda = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & if\ x > \pi \end{cases}$ 7M 4 3

OR

8. a) Determine the Fourier sine and cosine transform of $2e^{-5x} + 5e^{-2x}$ 7M 4 3

b) Determine the finite Fourier cosine transform of f(x) defined by $f(x) = \pi/3 - x + x^2/2\pi$, $0<x<\pi$. 7M 4 3

UNIT–V

9. a) Using shifting theorem, determine $Z(n+1)^2$ and $Z\left[\frac{1}{(n+2)(n+3)}\right]$ 7M 5 3

b) If $\frac{3z^2-4z+7}{(z-1)^3}$ is the Z – transform of u_n, then determine u_0, u_1, u_2 7M 5 3

OR

10. a) Determine the inverse Z – transform of $\frac{z}{(z+3)^2(z-2)}$ 7M 5 3

b) Solve the difference equation, using Z – transforms $y(n+2)+3y(n+1)+2y(n)=0$, given y(0) = 0, y(1) = 1 7M 5 3

END

Hall Ticket Number :										

R-19

Code: 19A245T

II B.Tech. II Semester Regular Examinations August 2021

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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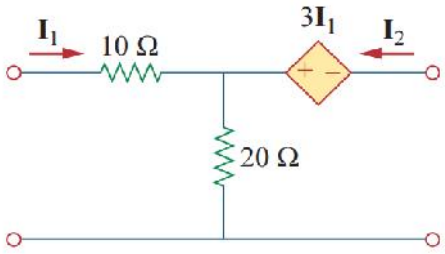
UNIT–I

1. a) Find the transmission parameters of the two-port network shown in figure.



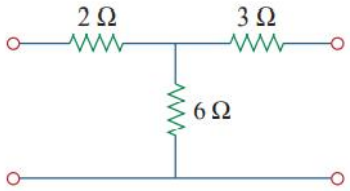
7M

b) Determine the Y and T parameters of a two-port network whose z-parameters are $[z]=\begin{bmatrix}6 & 4\\ 4 & 6\end{bmatrix}\Omega$ 7M

OR

2. a) Explain in detail about *h* parameters and using its mathematical equations draw the two-port equivalent network. 7M

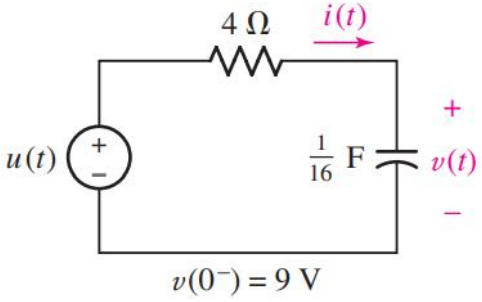
b) Determine the h-parameters of the network shown in figure.



7M

UNIT–II

3. a) Determine i(t) for t > 0 in the series RC circuit shown in figure



7M

b) Employ the initial-value theorem to determine the initial value of each of the following time-domain functions: (a) $\frac{u(t-2)+[u(t)]^2}{2}$.(b) $\sin(5t)\,e^{-2t}\,u(t)$ 7M

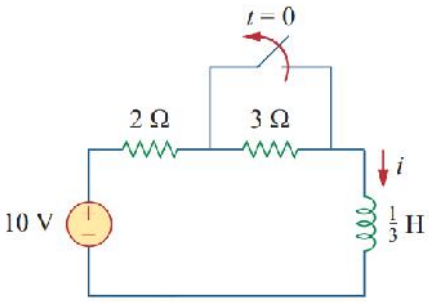
OR

4. Find the initial and final values of the functions whose Laplace transforms are

i) $G(s)=\frac{20}{(s+3)(s^2+8s+25)}$ ii) $G(s)=\frac{3s^3+2s+10}{s(s+3)(s^2+4s+4)}$ 14M

UNIT–III

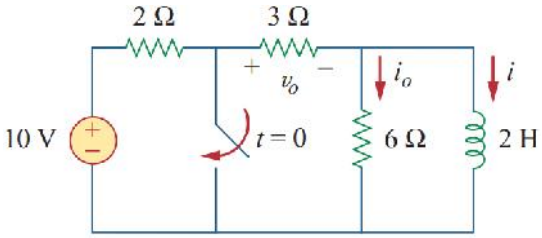
5. Find i(t) in the circuit shown in Figure. Assume that the switch has been closed for a long time.



14M

OR

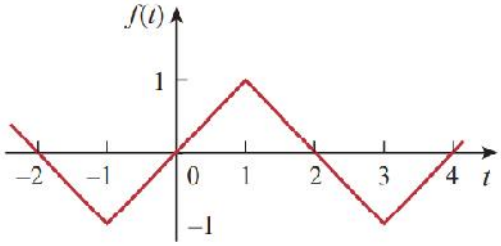
6. In the circuit shown in Figure, find i_0,v_0 and i for all time, assuming that the switch was open for a long time



14M

UNIT–IV

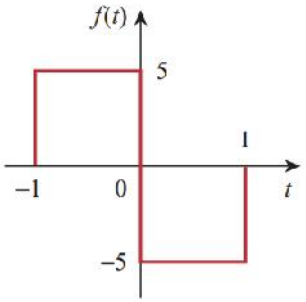
7. Calculate the Fourier series coefficients for the function shown in figure.



14M

OR

8. Obtain the Fourier transform of the function shown in figure.



14M

UNIT–V

9. a) Test the following polynomials for the Hurwitz property for $s^3 + 4s^2 + 5s + 2$. 7M

b) Which of the polynomials remain positive for all $\omega \geq 0$

$A(\omega^2) = \omega^{10} + 6\omega^8 + 4\omega^6 + 7\omega^4 + 10\omega^2 + 20$ 7M

OR

10. a) Explain the properties of RL driving point Impedance function 7M

b) Test whether the following functions represent the RC driving point impedance functions

(i) $z(s) = \frac{(s+4)(s+2)}{(s+1)}$ (ii) $z(s) = \frac{(s+1)(s+6)}{(s+2)(s+3)}$ 7M

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