Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations February 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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UNIT–I

1. 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

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. Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|\mathrm{Re}\,al\ f(z)|^2=2|f'(z)|^2$ where $w=f(z)$ is analytic. 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. Expand $Log\ z$ by Taylor's series about z=1. 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. 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 $|z|<1$ 7M

UNIT–V

9. Show that the image of the hyperbola $x^2-y^2=1$ under the Transformation $w=\frac{1}{z}$ is the Lemniscate $^{\circ 2}=\cos 2¤$ 14M

OR

10. Show that the function $w=\frac{4}{z}$ transforms the straight line x=c in the z-plane into a circle in the w-plane. 14M

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Hall Ticket Number :										

R-17

Code: 7G244

II B.Tech. II Semester Supplementary Examinations February 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	CO	Blooms Level

UNIT–I

1. a) A three phase balanced delta connected load of (4+j8) ohm is connected across a 400 V three phase balanced supply. Determine the phase currents and line currents. 7M

   b) Show that $V_L = \sqrt{3}\ V_{ph}$ for 3-Φ, balanced, Y- connected system. 7M

OR

2. a) A symmetrical 400V, 3 phase supplies a star connected load with $Z_R = 20\Omega$, $Z_Y = j50\Omega$, &$Z_B = -j5\Omega$. Determine the line currents phase sequence is RYB. 7M

   b) A symmetrical 3-Φ, 3-wire 400V supply is connected to a delta connected load. The impedance in each branch $Z_{RY} = 20 \angle 30^0\ \Omega$, $Z_{YB} = 40 \angle 60^0\ \Omega$ $Z_{BR} = 10 \angle -90^0\ \Omega$. Calculate phase currents, line currents and power consumed by the load. Assume phase sequence RYB. 7M

UNIT–II

3. a) Illustrate initial and final value of given transfer function

$$S + 5/S(S-2)(S^2+2S+3)$$ 7M

   b) Explain the step response of series RC Circuit using Laplace Transform. 7M

OR

4. a) Determine the inverse Laplace transform of the following functions.

(i) $A(S) = \frac{(S+1)}{S(S+2)}$ (ii) $B(S) = \frac{S^2}{(S^2+1)^2}$ 7M

   b) Determine the Laplace transform of the periodic saw tooth wave of amplitude 20V and time period of 2sec. 7M

UNIT–III

5. a) Derive the expression for current response of RC series circuit with a DC excitation. 7M

b) A series RL circuit with R=20Ω and L=10H has a constant voltage V=50v applied at t=0. Determine the current and voltage across resistor and inductor. 7M

OR

6. In a series RLC circuits consist of R=20Ω, L=0.05H and C=20μF is connected to a constant source 100 V applied at t=0. Calculate transient current 14M

UNIT–IV

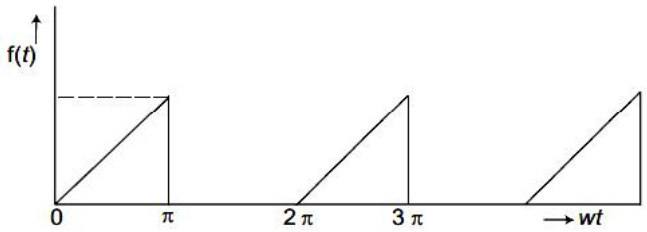
7. a) Explain the evaluation of trigonometric Fourier coefficients 7M

b) Determine the Fourier transform of the following functions

i) $f(t) = e^{-a|t|}$ ii) **f(t) = 1** 7M

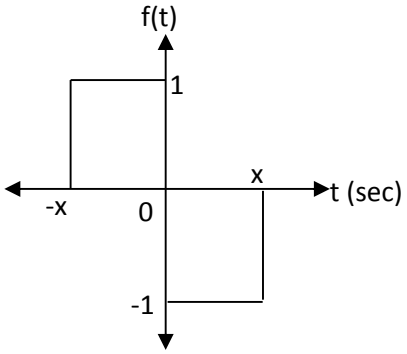
OR

8. a) Determine the trigonometric Fourier series of the waveform show in fig.



7M

b) Calculate the Fourier Transform of the waveform shown in fig



7M

UNIT–V

9. a) Discuss the necessary conditions for a driving point function 8M

b) Test the function $H(s) = 4s^6 + 2s^5 + 17s^4 + 8s^3 + 16s^2 + 6s + 3$ is Hurwitz or not 6M

OR

10. The driving point impedance of a one port reactive network is given by

$$Z(S) = 5\frac{(S^2+4)\ \ (S^2+25)}{S\ (S^2+16)}$$

Determine the first and second foster network. 14M

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Hall Ticket Number :										

R-17

Code: 7G242

II B.Tech. II Semester Supplementary Examinations February 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	Blooms Level
		UNIT–I			
1.	a)	State and explain Coulomb's law in vector form?	7M	CO1	L3
	b)	Calculate EFI at a point P (3, -4, 2) in free space for Q_1 =2μc at (0, 0, 0) and Q_2=3μc at (-1, 2, 3).	7M	CO1	L3
		OR			
2.	a)	Derive the expression for Electric Field Intensity due to Infinite sheet of charge using Gauss' law?	7M	CO1	L3
	b)	State and Explain Maxwell's Second equation?	7M	CO1	L3
		UNIT–II			
3.	a)	Derive the expression for electric potential and EFI due to an electric dipole?	7M	CO2	L1
	b)	Write short notes on conduction and convection current density?	7M	CO2	L1
		OR			
4.	a)	Derive the conditions at the boundary between two dielectrics?	7M	CO2	L1
	b)	Derive the Laplace's and Poisson's equations in an electric field?	7M	CO2	L1
		UNIT–III			
5.	a)	Using Biot-Savart's Law find MFI due to a straight current carrying filament?	7M	CO3	L3
	b)	State and explain Ampere's Circuital Law?	7M	CO3	L3
		OR			
6.	a)	Derive the expression for vector magnetic potential from Biot-Savart's law.	7M	CO3	L3
	b)	State and Explain Maxwell's Fourth equation?	7M	CO3	L3
		UNIT–IV			
7.	a)	Derive the expression for force on a current element in a magnetic field?	7M	CO4	L1
	b)	Two long parallel conductors are separated by 2 cm in air carrying current of 100A flowing in opposite directions. Find the force per meter length of the conductor?	7M	CO4	L1
		OR			
8.	a)	Derive the expression for torque on a current loop placed in a magnetic field?	7M	CO4	L1
	b)	Derive the expression for energy stored and energy density in the magnetic field	7M	CO4	L1
		UNIT–V			
9.	a)	State and explain Faraday's laws of electromagnetic induction in point form and Integral form?	7M	CO5	L3
	b)	Derive the expression for modified Maxwell's equation for time varying fields.	7M	CO5	L3
		OR			
10.	a)	Find the displacement current within a parallel plate capacitor where $\varepsilon=100\varepsilon_o$, $A=0.1m^2$, d=0.05mm and the capacitor voltage is 100 sin2000π t volts.	7M	CO5	L3
	b)	State and explain Poynting theorem? What is the significance of Poynting Vector?	7M	CO5	L3

END

Hall Ticket Number :										

R-17

Code: 7G536

II B.Tech. I Semester Supplementary Examinations February 2022

Fluid Mechanics and Hydraulic Machines

(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) Define the following properties of the fluid.
   i) Specific Weight ii) Specific Gravity iii) viscosity iv) Surface Tension — 8M
   b) Calculate the Density, Specific weight and Specific gravity of One liter of liquid, which weighs 7N. — 6M

OR

2. a) Explain the property viscosity of a fluid. Also describe its variation with temperature. — 7M
   b) The dynamic viscosity of an oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of oil film is 1.5 mm. — 7M

UNIT–II

3. a) Explain the minor losses in pipes briefly. — 7M
   b) At a sudden enlargement of water main from 240 mm to 480mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. — 7M

OR

4. State the Bernoulli's theorem and derive the Bernoulli's equation completely from the fundamental Euler's equation of fluid motion. — 14M

UNIT–III

5. a) Derive an expression for force exerted by the jet on the flat vertical plate moving in the direction of the jet. — 8M
   b) A nozzle of 50 mm diameter delivers a stream of water at 20 m/sec perpendicular to the plate that moves away from the jet at 5m/sec. Find i) the force on the plate ii) the work done ii) the efficiency of the jet. — 6M

OR

6. a) What is pumped storage power plant and explain its concept. 7M

   b) Describe the various storage requirements of hydroelectric power station. 7M

UNIT–IV

7. a) Explain the various parts of Pelton turbine and its working with the neat sketch. 8M

   b) A Pelton wheel has a mean bucket speed of 10m/sec with a jet water flowing at the rate of 700 liters per second under a head of 30 meters. The bucket deflects the jet at angle of 160^0. Calculate the power given by the water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. 6M

OR

8. a) Define the unit quantities and describe them with expressions 8M

   b) A turbine develops 500 kW power under a head of 100 meters at 200 r.p.m. What would be its normal speed and output under a head of 81 meters 6M

UNIT–V

9. a) Explain the working principle of single acting reciprocating pump with neat sketch. 7M

   b) Define indicator diagram and also show that area of indicator diagram is proportional to the work done by the reciprocating pump. 7M

OR

10. a) Define slip, percentage of slip and negative slip of the reciprocating pump 7M

    b) A single acting reciprocating pump running at 50 r.p.m., delivers 0.01 m^3/sec of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine:

    i) The theoretical discharge of pump ii) coefficient of discharge iii) slip and percentage of slip of the pump. 7M

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Hall Ticket Number :										

R-17

Code: 7G243

II B.Tech. II Semester Supplementary Examinations February 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) Explain the effect of feedback in reducing parameter variations. 7M
   b) Derive an expression for the transfer function of a Field controlled DC servo motor. 7M

OR

2. a) Explain the properties of Signal Flow Graph 7M
   b) Derive an expression for the transfer function of an AC servo motor 7M

UNIT–II

3. a) Determine the underdamped response of second order control system subjected to unit step input function 8M
   b) Obtain the rise time , peak time, maximum peak overshoot and settling time of the unit step response of a closed loop control system given by $G(s) = \frac{36}{S^2 + 2S + 36}$ 6M

OR

4. a) Define Type & Order of a System with examples. 4M
   b) Explain about time domain specifications 10M

UNIT–III

5. a) Explain the construction rules for root locus technique. 7M
   b) Test the stability of the system with the following characteristic equation by Routh's test $s^6+2s^5+8s^4+20s^2+16s+16=0$ 7M

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

UNIT–IV

7. Explain bode plots of basic factors of a transfer function. 14M

OR

8. Sketch the Bode plot and find the Phase margin and gain margin for the system $G(s)H(S) = \frac{10S(3+S)}{S(S+2)(S^2+S+2)}$ 14M

UNIT–V

9. a) What is state transition matrix? State and prove its properties. 7M
   b) Derive the expression for transfer function of State Model. 7M

OR

10. Explain design of the basic lead compensator using Bode plot. 14M

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Hall Ticket Number :										

R-17

Code: 7G241

II B.Tech. II Semester Supplementary Examinations February 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) Explain the different types of losses in the transformer. 6M

   b) A 4400 V, 50-Hz transformer has a hysteresis loss of 1200 W, eddy current loss of 1800 W and full-load copper loss of 4000 W. If the transformer is supplied at 6600 V, 75-Hz. What will be the losses? 8M

OR

2. a) Derive the condition for maximum efficiency in a single phase transformer. 7M

   b) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and the corresponding leakage reactance are 1.1 Ω and 0.035 Ω . The supply voltage is 2200V. Calculate:

   (i) equivalent impedance referred to primary and (ii) the secondary terminal voltage for full load having a power factor of 0.8 leading. 7M

UNIT–II

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

   b) A two winding transformer is rated at 2400/240 V, 50 KVA. It is reconnected as a step up auto transformer, with 2400 V input. Calculate the rating of the auto transformer and the inductively and conductively transferred powers while delivering the rated output at unity pf. 7M

OR

4. a) With neat circuit diagram explain principle of operation of a Sumpner's test on single phase transformer. 7M

   b) A 100 KVA lighting transformer has a full load loss of 3 KW, the losses being equally divided between iron and copper. During a day, the transformer operates on full load for 3 hours, one half loads for 4 hours, and the output being negligible for the remainder of the day. Calculate the all day efficiency. 7M

UNIT–III

5. a) Compare the Y/Y and Δ/Δ connections of 3-Ph transformer with neat diagrams. 8M

b) A 3-phase, 500 kVA, 6000V/400V, 50Hz, delta-star connected transformer is delivering 300 kW, at 0.8 pf lagging to a balanced 3-phase load connected to the LV side with HV side supplied from 6000 V, 3- phase supply. Calculate the line and winding currents in both the sides. Assume the transformer to be ideal. 6M

OR

6. a) Prove that "the load shared by the transformers is inversely proportional to its impedance when they are in parallel". 7M

b) Two 1-Ph transformers A and B are connected in parallel to same load. Determine the current delivered by each transformer, given: OC emf 6.6KV for A and 6.4KV for B. Equivalent leakage impedance in terms of the secondary are (0.3+j3)Ω and (0.2+j1)Ω respectively. Total impedance is (8+j6)Ω. 7M

UNIT–IV

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

b) The power input to the rotor of 440V, 50 Hz, 6 pole, 3-phase, and induction motor is 80 KW. 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. 7M

OR

8. a) With neat sketch, explain how rotating magnetic field is produced in a three phase induction motor. 8M

b) Explain the phenomenon of crawling and cogging. Also explain it effect. 6M

UNIT–V

9. a) Explain the principle of speed control of a 3-phase induction motor by V/f method and draw the corresponding torque-speed characteristics and discuss the applications and limitations of these methods. 7M

b) A cage induction motor when started by means of a star-delta starter takes 190% of full load line current and develops 40% of full load torque at starting. Determine the starting torque and current in terms of full load values, if an auto transformer with 80% tapping were employed. 7M

OR

10. a) Explain the working principle of Induction generator. 6M

b) Explain the conducting procedure of No load and Blocked rotor test on three phase induction motor. 8M

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Hall Ticket Number :										

R-17

Code: 7G345

II B.Tech. II Semester Supplementary Examinations February 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	CO	Blooms Level
		UNIT–I			
1.	a)	Describe the internal block diagram of an Op-amp and explain each block in detail	10M		
	b)	List the ideal characteristics of an op-amp	4M		
		OR			
2.	a)	Design an non inverting Op Amp with gain 120.	7M		
	b)	Describe the features of differential amplifier.	7M		
		UNIT–II			
3.	a)	Explain how voltage can be converted into current using Op-Amp.	7M		
	b)	Illustrate the operation of inverting summer circuit using IC 741.	7M		
		OR			
4.		Discuss the Op-amp ideal differentiator and mention its drawbacks. Also explain how to overcome these drawbacks with practical differentiator.	14M		
		UNIT–III			
5.	a)	What is the basic principle of operation of a comparator? and discuss the operation of inverting Comparator using Op-Amp.	7M		
	b)	Demonstrate the applications of Op-Amp Comparator.	7M		
		OR			
6.	a)	Design a circuit for generating Triangular wave by using Op-Amp and derive necessary equations?	9M		
	b)	Design a triangular wave generator using comparator and integrator to oscillate at 4KHz and peak to peak voltage of 7V. Use the Op-Amp with $\pm$15V power supply and make necessary assumptions.	5M		
		UNIT–IV			
7.	a)	Explain the basic principle of operation using block schematic of a PLL.	8M		
	b)	Discuss how PLL can be used for AM demodulation.	6M		
		OR			
8.		Illustrate the operation of monostable multivibrator circuit using IC 555 and derive the expression for time period	14M		
		UNIT–V			
9.	a)	Illustrate the operation of weighted resistor DAC.	7M		
	b)	Discuss the operation of Servo tracking ADC.	7M		
		OR			
10.		Classify the types of ADC and Explain the principle of operation of dual-Slope ADC with necessary diagrams.	14M		

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