Hall Ticket Number :										

R-17

Code: 7G241

II B.Tech. II Semester Supplementary Examinations August 2021

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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UNIT–I

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

   b) A 25 KVA single phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500 V, 50Hz mains. Calculate (i) primary and secondary currents on full load (ii) secondary emf (iii) maximum flux in the core 7M

OR

2. a) Draw a graph and explain how efficiency changes with respect to power factor. 7M

   b) The secondary winding of step up transformer takes a current of 820 A, when working at full load at 0.8 power factor lagging. The primary current is 30 A at 0.7 power factor lagging, if the transformation ratio is 30:1, calculate the no-load current? 7M

UNIT–II

3. a) Describe the experimental test procedure to separate the core losses of a transformer. 7M

   b) A 10 KVA, 500/250 V single phase transformer has its maximum efficiency of 94% when delivering 90% of its rated output at unity pf. Estimate its efficiency when delivering its full load output at pf of 0.8 lagging. 7M

OR

4. A 1100/400V, 1-phase transformer gave the following test results:
   Open circuit test: 1100V, 2A, 180W on l.v. side
   Short circuit test 20V, 25A, 20W on h.v. side
   Calculate the equivalent circuit constants. Also draw the equivalent circuit. 14M

UNIT–III

5. a) Write a short note on Δ/Y and Y/Δ connections of 3-Ph transformer with neat diagrams. Mention the advantages of each connection 8M

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

OR

6. Briefly explain various type 3-Ph transformer connections with neat diagrams. 14M

UNIT–IV

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

   b) A 3-phase, 50Hz, 4-pole induction motor has a slip of 4%. Calculate speed of the motor and frequency of rotor e.m.f. 6M

OR

8. a) Discuss the points of similarities between a transformer and an induction motor. Hence, explain why an induction machine is called a generalized transformer? 7M

   b) A three phase, 400 V, 50 Hz induction motor takes a power input of 35 kW at its full load speed of 980 rpm. The total stator losses are 1 kW and the friction and windage losses are 1.5 kW. Calculate (i) slip (ii) rotor ohmic losses (iii) shaft power (iv) shaft torque and (v) efficiency 7M

UNIT–V

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

   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

OR

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

    b) The rotor resistance and standstill reactance per phase of a 3 phase slip-ring induction motor are 0.05Ω and 0.2Ω respectively. What should be the value of external resistance per phase to be inserted in the rotor circuit to give maximum torque at starting? 7M

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Hall Ticket Number :										

R-17

Code: 7G345

II B.Tech. II Semester Supplementary Examinations August 2021

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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UNIT–I

1. a) What is an IC? List out the IC Classifications and Explain 7M
   b) With a neat circuit diagram explain basic operational amplifier circuit 7M

OR

2. a) Draw the circuit of inverting amplifier and derive the gain of the same. 7M
   b) Derive the gain of non-inverting amplifier 7M

UNIT–II

3. a) Design an adder circuit using Op-Amp to get output voltage $V_o=(0.1V_1+V_2+10V_3)$. Consider V_1,V_2,V_3 are input voltages. 7M
   b) Illustrate the operation of non-inverting summer 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) Illustrate the operation of Schmitt Trigger circuit using IC 741. 7M
   b) Explain the operation of Precision Half-wave Rectifier. 7M

OR

6. a) Discuss the operation of Anti-Log Amplifier. 7M
   b) Write Short notes on RC active filters. 7M

UNIT–IV

7. a) With the help of functional block diagram explain the operation of IC 555. 8M
   b) Draw the pin diagram of IC 555 and list out its applications 6M

OR

8. a) Explain how PLL can be used for FM demodulator. 6M
   b) Discuss how PLL can be used as frequency translator. 8M

UNIT–V

9. Construct the R-2R DAC and explain in detail. 14M

OR

10. a) What are the advantages of SAR ADC? Explain its operation 8M
    b) What output voltage would be produced by D/A converter whose output range is 0 to 10V and whose input binary is
    i) 10 (for a 2-bit DAC)
    ii) 0110 (for a 4-bit DAC) 6M

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations August 2021

Complex Variables and 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) Find real and imaginary parts $\cot z$ 7M

   b) Find all the roots of $\sin z = 2$ 7M

UNIT–II

3. Determine P such that the function $f(z)=\frac{1}{2}\log\left(x^2+y^2\right)+i\,Tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function 14M

OR

4. Find an analytic function whose real part is $e^{-x}\left[x\sin y - y\cos y\right]$ 14M

UNIT–III

5. Evaluate $\int_c \left(y^2+2xy\right)dx+\left(x^2-2xy\right)dy$ where c is the boundary of the region by $y=x^2$ *and* $x=y^2$ 14M

OR

6. Expand $Log\, z$ by Taylor's series about z=1. 14M

UNIT–IV

7. 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

OR

8. Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is the circle $|z|=3$ 14M

UNIT–V

9. Find the bilinear Transformation which maps the point (-1, 0, 1) into the points (0, i, 3i). 14M

OR

10. Find the image of the region in the z-plane between the lines y=0 and $y=\frac{®}{2}$ under the Transformation $w=e^z$. 14M

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Hall Ticket Number :										

R-17

Code: 7G244

II B.Tech. II Semester Supplementary Examinations August 2021

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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UNIT–I

1. 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

OR

2. a) A balanced star connected load has an impedance of (8+j6) Ω/phase and supply voltage is 415 V, 3-Φ supply. Calculate i) line currents ii) PF iii) Total active power 7M

   b) Show that $\Phi = \tan^{-1}[\sqrt{3}\,(W_1-W_2)\,/\,(W_1+W_2)]$ for 3-Φ balanced lagging power factor load. 7M

UNIT–II

3. 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

OR

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

   i) $2\cos^2(t)$ ii) $t \sin(2t)$ 7M

   b) Calculate initial & final value of the function $f(t) = 2+e^{-3t}\cos 2t$ 7M

UNIT–III

5. a) Explain the significance of initial conditions. 5M

   b) A series RL circuit with R=50Ω and L=0.2H has a Sinusoidal Voltage source V(t)=150Sin500t. Determine the expression for i(t). 9M

OR

6. Derive the expression for current when series RLC Circuit is excited by sinusoidal voltage source $V(t) = V_m \sin(\omega t+\theta)$ when switch is closed at t=0 14M

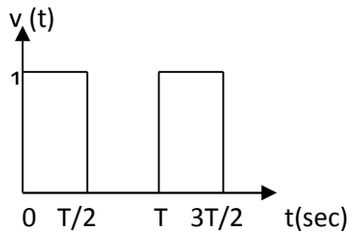
UNIT–IV

7. a) Explain all wave form symmetry by using relevant examples. 7M

   b) Discuss properties of Fourier transforms. 7M

OR

8. a) Illustrate the trigonometric Fourier series expansion of the waveform shown in fig



7M

   b) Determine Fourier transform of Gaussian function. 7M

UNIT–V

9. a) Explain the necessary conditions for a transfer function 7M

   b) Synthesize the given impedance function using elementary synthesis.

$$Z(S) = \frac{6S^3 + 3S^2 + 6S + 2}{3S^3 + 3S}$$

7M

OR

10. Determine the Cauer form I and II realizations for $Z(s) = \dfrac{2(s^2+1)(s^2+9)}{s(s^2+4)}$ 14M

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Hall Ticket Number :										

R-17

Code: 7G242

II B.Tech. II Semester Supplementary 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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UNIT–I

1. a) State and explain Coulomb's law of electrostatics field in vector form 7M

   b) Two point charges Q_1=35 micro coulombs and Q_2=60 micro coulombs are located at (-4,-6,-8) and (3,5,2) respectively. Find force on Q_1. 7M

OR

2. a) Obtain an expression for the total force experienced by a point charge due to infinite number of point charges around it. 7M

   b) Two small identical conducting spheres have charge of 2 nC and -0.5 nC respectively. When they are placed 4cm apart, What is the force between them? If they are brought into contact and then separated by 4 cm, what is the force between them? 7M

UNIT–II

3. a) Derive the expression for potential due to dipole? 7M

   b) Two point charges of 1 micro coulomb and -1 micro coulomb are located at (0,0,1) and (0,0,-1) m respectively in free space.
   (i) Find the potential at (0,3,4)m
   (ii) Recalculate the same potential treating the charges as a pure dipole. 7M

OR

4. a) Derive the expression for Torque on a dipole in an electric field. 7M

   b) Derive the expression for capacitance of single phase transmission line. 7M

UNIT–III

5. a) State and explain Ampere's circuital law with any one application. 7M

   b) Derive the expression for H due to a infinite long coaxial transmission line using Amperes circuital law. 7M

OR

6. a) Show that the magnetic field intensity at the end of a solenoid is equal to the half of the magnetic field at the centre of the solenoid. 7M

   b) A uniform solenoid 100 mm in diameter and 400 mm long has 100 turns of wire and a current of I=3A.Find the magnetic field on the axis of the solenoid.
   i) at the center ii) At one end iii) Half way from the center to one end. 7M

UNIT–IV

7. a) Derive an expression for the inductance of solenoid? 7M

   b) State and prove the conditions on the tangential and normal components of magnetic flux density and magnetic field intensity at the boundary between dielectrics. 7M

OR

8. a) State and derive Lorentz force equation. 7M

   b) Derive the expression for inductance of a two wire transmission line. 7M

UNIT–V

9. a) State and explain faradays laws of electromagnetic induction? 7M

   b) A circular loop of 10 cm radius is located in the x-y plane in a field given by $\overline{B}$=0.5 cos 377t($3a_y$+$4a_z$)Tesla. Find the emf induced in the loop. 7M

OR

10. a) Compare and contrast electric and magnetic fields? 7M

    b) Write Maxwell's equations for time varying fields in point and integral form? 7M

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Hall Ticket Number :										

R-17

Code: 7G344

II B.Tech. II Semester Supplementary Examinations August 2021

Field Theory and Transmission Lines

(Electronics and Communication 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) Define co-ordinate system? Explain different types of co-ordinate systems. 10M
   b) Write a short note on following: i) Stoke's theorem ii) Divergence theorem. 4M

OR

2. a) Define Electric potential? Derive the expression for Electric potential. 7M
   b) Determine the Divergence and curl vector field as $T=10r \sin_2\theta\ 2\cos\Phi$. 7M

UNIT–II

3. a) Write and explain different kinds of current density's with suitable diagrams and expressions. 7M
   b) In a cylindrical conductor of radius 2mm,the current density varies with distance from the axis according to $J= 10^3\ e^{-400r} A/m^2$. Find the total current I. 7M

OR

4. a) Derive the expressions for resistance of conductor with uniform cross section 7M
   b) If $J=1/r^3\ (2\cos\theta a_r + \sin\theta\ a\theta)\ A/m^{2,\ c}$alculate the current passing through
      i) A hemispherical shell of radius 20cm,$0<\theta<\pi/2$, $0<\Phi<2\pi$
      ii) A spherical shell of radius 10cm 7M

UNIT–III

5. a) Derive the force equation due to current element. 7M
   b) Write Maxwell's equations for static EM fields. 7M

OR

6. State and prove Biot savart's law ,using Biot savart's law derive an expression for magnetic field strength H due to a finite &Infinite filamentary conductor carrying a current I and placed along Z-axis at appoint P on Y–axis .hence deduce the magnetic field strength for the length of the conductor extending from $-\infty+\infty$. 14M

UNIT–IV

7. a) Define the wave? List out the different medias and Give the properties of different medias. Write the E&H equations in those medias. 7M
   b) A uniform plane wave propagating in medium has $E= 2\ e^{-\alpha z} \sin(10^8 t - \beta z)\ a_y$ V/m. If the medium is characterized by $\epsilon_r=1$, $\mu_r = 20$ and $\sigma=3$ S/m. Find α , β and H. 7M

OR

8. a) Derive the relation between E& H in a uniform plane wave. find the value of intrinsic impedance of free space . 7M
   b) In free space $H= 0.1\cos(2x10^8 - \beta_z)\ a_{y\ A/m,}$ calculate i) β, λ and T ii) the time t_1 takes by the wave to travel a distance of $\lambda/8$. 7M

UNIT–V

9. a) Define transmission line? And explain different types of transmission line with neat sketches. 8M
   b) Discuss about infinite line concept. 6M

OR

10. a) Derive the expression for the input impedance of a transmission line of length. 7M
    b) A loss less line of 300Ω is terminated by a load of $Z_{R.}$ if the VSWR at 200MHZ is 4.48,and the first V_{min} is located at 6 cm from the load .calculate the reflection coefficient and Z_R 7M

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