Hall Ticket Number :										

R-14

Code: **4G242**

II B.Tech. II Semester Supplementary Examinations October 2020

Electical Circuits-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Write the advantages of three phase system over single phase system. 7M

   b) A balanced star connected load has an impedance of (8+j6) Ω/phase and supply voltage is 230 V, 3-Φ supply. Find i) line currents ii) PF iii) Total active power iv) Total reactive power. 7M

OR

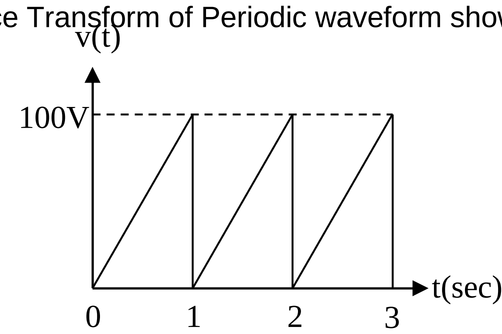
2. a) Prove that $V_L=\sqrt{3}\ V_{ph}$ for star connected system. 7M

   b) Two wattmeter's are used to measure power in a 3- Φ ,3 wire load .Determine the total power ,PF and Reactive power if wattmeter reads i) 1000W each both positive ii) 1000W each, but opposite sign. 7M

UNIT–II

3. a) State and Prove Initial value theorem and Final value theorem. 7M

   b) Find the Laplace Transform of Periodic waveform shown in fig.



7M

OR

4. a) Obtain the step response of series RL Circuit using Laplace Transform. 7M

   b) Find the inverse Laplace transform of $F(s)=\dfrac{10}{(s+1)(s+2)(s+3)}$ 7M

UNIT–III

5. a) Explain the significance of initial conditions. 4M

   b) Obtain the DC transient response of RC Series circuit. 10M

OR

6. A series RL circuit with R=50Ω and L=0.2H has a Sinusoidal Voltage source v=150 Sin500t. Find the expression for i(t). 14M

UNIT–IV

7. Find the trigonometric Fourier series of the waveform shown in fig

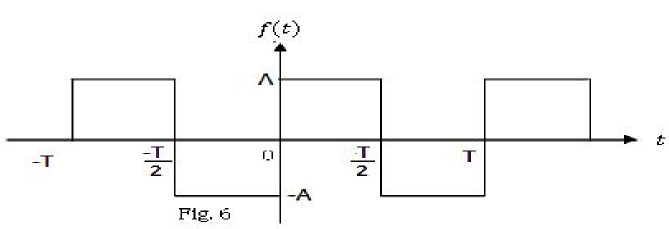


Fig. 6

14M

OR

8. A series RL circuit with R=5Ω and L=20mH has an applied voltage of v(t)=(100+50sinωt+25sin3ωt) volts with ω=500 rad/sec. Find the current and average power. 14M

UNIT–V

9. State and explain the necessary and sufficient conditions for positive real functions. 14M

OR

10. a) State and explain the necessary and sufficient conditions for driving point functions. 7M

    b) Synthesize the impedance function $Z(s)=\dfrac{s^3+4s}{s^2+2}$. 7M

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Hall Ticket Number :										

R-14

Code: 4G241

II B.Tech. II Semester Supplementary Examinations October 2020

Electrical Machines-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. Discuss the constructional features of transformers. Draw neat diagrams. 14M

OR

2. Explain the principal of operation of transformer. Derive its e. m. f. equation. 14M

UNIT–II

3. a) Draw the Exact and approximate equivalent circuits of 1-Φ transformer and explain. 8M

   b) A 1-phase transformer has 180 turns respectively in its secondary and primary windings. The respective resistances are 0.233 Ω and 0.067 Ω. Calculate the equivalent resistance of (i) the primary in terms of the secondary winding, (ii) the secondary in terms of the primary winding, and (ii) the total resistance of the transformer in terms of the primary and secondary. 6M

OR

4. a) In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum. 7M

   b) A200kVA 1-phasetransformer is in operation continuously. For 8 hours in a day, the load is 160kW at 0.8 pf. For 6 hours, the load is 80kW at unity pf and for the remaining period of 24hours it runs on no-load. Full-load copper losses are 3.02 kW and the iron losses are 1.6kW. Find all-day efficiency. 7M

UNIT–III

5. Draw the Connection diagram of Y- Δ and Δ - Y connected three-phase transformer. 14M

OR

6. Explain the scott connection of three phase transformer with neat diagram. 14M

UNIT–IV

7. a) Explain the principle of operation of Induction motor. 7M

   b) A 4 pole, 3-phase induction motor operates from a supply whose frequency is 50Hz. Calculate.

   i. the speed at which the magnetic field of the stator is rotating.

   ii. the speed of the rotor when the slip is 0.04

   iii. the frequency of the rotor currents when the slip is 0.03

   iv. the frequency of the rotor currents at standstill. 7M

OR

8. a) Explain why an induction motor will never run at its synchronous speed? 7M

   b) A3-phase, 50Hz squirrel cage induction motor runs at 4% slip. What will be frequency of rotor currents? And speed of the machine? 7M

UNIT–V

9. a) Explain no load tests and blocked rotor tests for an 3-phase induction motor. 7M

   b) In a no load test, an induction motor took 10 A and 450 W with a line voltage of 110 V. If stator resistance per phase is 0.05 Ω and friction and windage losses amount to 135 W. calculate the exciting conductance and susceptance/ph. 7M

OR

10. Draw the circle diagram of a 20HP, 400V, 50 Hz, 4 pole, 3-phase star connected induction motor from the following test data (line values):

    No-load: 400V; 9A; $\cos\phi_0$= 0.2 Blocked Rotor: 200V; 50A; $\cos\phi_{sc}$= 0.4

    From the circle diagram Find

    (a) Line current, P.f and full load slip (b) Starting torque and maximum torque, both in N-m (c) the slip for maximum torque (d) the maximum output and maximum input (e) Efficiency of motor. 14M

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Hall Ticket Number :										

R-14

Code: 4G244

II B.Tech. II Semester Supplementary Examinations October 2020

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Define open loop and closed loop systems. Explain advantages and disadvantages of open loop and closed loop systems. 7M

   b) Describe any two types of open loop systems and explain how they are converted into closed loop system 7M

OR

2. a) Explain the properties of Signal Flow Graph. 7M

   b) Derive the transfer function of armature controlled dc servo motor. 7M

UNIT–II

3. a) Sketch the unit step response of a prototype second order system and show that the percentage over shoot is a function of a damping factor alone. 7M

   b) For a unity feedback system the open loop transfer function is given by

   $$G(s)=\frac{10}{s(s+4)}.$$

   Determine: **i**) maximum overshoot **ii**) rise time **iii**) settling time and **iv**) steady state error if the input is a unit step. 7M

OR

4. a) Explain about time domain specifications 7M

   b) Define Type & Order of a System. 7M

UNIT–III

5. The open loop transfer function of a feedback control system is given by G(S)H(S)= $\frac{K}{S(S+4)(s^2+2S+2)}$ Determine the stability of the system when K=12 and find the range of K for stability. 14M

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. Plot the Nyquist plot for $G(s)H(s)=\frac{K(s+1)}{s(s+1)}$. For K > 0 find the number of closed loop poles in the right half s-plane and comment on stability. 14M

OR

8. Sketch the Bode plot for the following transfer function and determine the system gain K for the gain cross over frequency to be 5 rad/sec. G(S)=$\frac{K(1+s)}{(1+0.2S)(1+0.02S)}$. 14M

UNIT–V

9. a) What are the advantages of state space representation? 7M

   b) What do you understand by state transition matrix? State and prove its properties 7M

OR

10. Explain in detail about the design of Lead Compensator using Bode Plot. 14M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations October 2020

Mathematics-III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Evaluate $\int_0^1 x^2\left(\log\frac{1}{x}\right)^3 dx$

   b) If sin(A + iB)=x+iy, prove that (i) $\frac{x^2}{\cosh^2 B}+\frac{y^2}{\sinh^2 B}=1, (ii)\frac{x^2}{\sin^2 A}-\frac{y^2}{\cos^2 A}=1$

OR

2. a) Show that $\int_0^{\frac{\pi}{2}} \sin^2\theta\ \cos^4\theta\, d\theta = \frac{\pi}{32}$

   b) Separate into real and imaginary parts for f(z) = tanz

UNIT–II

3. Prove that the function f(z) defined by $f(z)=\begin{cases}\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & z\neq 0\\ 0, & z=0\end{cases}$ is continuous and the C – R equations are satisfied at the origin. Yet $f^1(0)$ does not exist.

OR

4. Find the analytic f(z) = u + iv, if u – v = $\frac{\cos x+\sin x-e^{-y}}{2\cos x-e^{y}-e^{-y}}$ and f(π/2) = 0

UNIT–III

5. a) State and prove Cauchy's theorem.

   b) Find the Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point $z=i$.

OR

6. a) If $f(z)$ is analytic inside a circle C with centre at a, then for z inside C prove that

$$f(z)=f(a)+f'(a)(z-a)+\frac{f''(a)}{2!}(z-a)^2+-----+\frac{f^n(a)}{n!}(z-a)^n+----$$

   b) Derive Cauchy's integral formula.

UNIT–IV

7. a) Determine the poles of the function $\frac{z^2+1}{z^2-2z}$ and the residue at each pole

   b) Use Rouche's theorem to show that the equation $z^5+15z+1=0$ has one root in the disc $|z|<\frac{3}{2}$ and four roots in the annulus $\frac{3}{2}<|z|<2$.

OR

8. a) Evaluate $\int_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle $(i)|z|=1,\ (ii)|z+1-i|=2$

   b) state and prove Argument Principle

UNIT–V

9. Find the bilinear transformation which maps the points z = 1, i, -1 onto the points w = i, 0, -i. Hence find (a) the image of $|z|<1$,

OR

10. Show that the transformation effected by an analytic function $w=f(z)$ is conformal at every point of the Z-plane where $f'(z)\neq 0$.

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Hall Ticket Number :										

R-14

Code: 4G346

II B.Tech. II Semester Supplementary Examinations October 2020

Pulse and Digital Circuits

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the operation of RC low pass circuit for a square wave input
   b) A 10Hz symmetrical square wave whose peak-to-peak amplitude is 2V is impressed upon a High pass circuit whose lower 3-dB frequency is 5Hz. Calculate and sketch the output wave form. In particular, what is peak-to-peak output amplitude?

OR

2. a) Explain the pulse response of an RC High pass circuit.
   b) What is the attenuator? Explain it with neat sketch.

UNIT–II

3. a) Discuss in detail about diode switching times
   b) Explain how transistor acts as a switch with relevant diagrams.

OR

4. a) State and prove clamping circuit theorem.
   b) Illustrate the operation of two-level diode clipper with appropriate expressions.

UNIT–III

5. a) Explain the basic principles of Miller and Bootstrap time base generators?
   b) Explain the principle of Synchronization and frequency division in blocking Oscillator?

OR

6. a) Draw and explain Sweep circuit using UJT?
   b) Derive the expression for slope error and sweep speed for the Bootstrap Sweep circuit?

UNIT–IV

7. a) Classify the different methods of generating a time base waveform? Explain them briefly.
   b) Describe the operation of Bootstrap time generator using transistors with neat sketch.

OR

8. a) Discuss about the simple Current sweep circuit
   b) Explain about the linearity correction through adjusting of driving waveform

UNIT–V

9. a) Draw the circuit of bidirectional sampling gate using diodes. Derive the expression for gain.
   b) What do you mean by pedestal? How pedestal can be reduced in sampling gate.

OR

10. a) Realize two inputs TTL NAND gate truth table and explain its operation with suitable circuit diagram.
    b) Examine the operation of OR & AND logic gates with diodes using truth table.

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