Hall Ticket Number :										

R-15

Code: 5GC41

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-15

Code: 5G345

II B.Tech. II Semester Supplementary Examinations August 2021

Electronic Circuit Theory

(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) Classify the amplifiers based on different parameters? 7M

   b) Construct the approximate h-parameter model for CE amplifier? 7M

OR

2. Discuss the classification of amplifiers and for CE Amplifier is driven by a voltage source V_S of internal resistance R_S=1KΩ and load impedance is R_L=20KΩ.The h-parameters of the transistor are: h_{ie}=1KΩ, h_{re}=2x10^{-4}, h_{fe}= 50 and h_{oe}=25μA/V. Compute the current gain A_I, input resistance R_i, voltage gain Av, Output resistance R_o using exact analysis. 14M

UNIT–II

3. What are the various capacitances that affect the performance of amplifier circuits and explain one example in detail 14M

OR

4. a) Explain about hybrid- pi conductances. 7M

   b) Explain CE short circuit current gain. 7M

UNIT–III

5. Draw the circuit diagram of voltage shunt feedback and derive expressions for input and output resistance. 14M

OR

6. a) List the differences between different types of negative feedbacks. 6M

   b) Draw different topologies of feedback amplifiers. 8M

UNIT–IV

7. Find the frequency of oscillations of Hartley oscillator circuit and obtain the condition for oscillations. 14M

OR

8. Derive the frequency of oscillations for Colpitts Oscillator using BJT 14M

UNIT–V

9. a) Define Q-factor and compare various tuned amplifiers. 6M

   b) Explain the operation of a single tuned capacitance coupled amplifier circuit and its frequency response 8M

OR

10. a) Differentiate between push-pull and complementary symmetry configuration of a class B power amplifier 6M

    b) Derive the expression for efficiency of a transformer coupled Class A power amplifier 8M

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Hall Ticket Number :										

R-15

Code: 5G241

II B.Tech. II Semester Supplementary 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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UNIT–I

1. Explain the principal of operation of transformer. Derive its e. m. f. equation.

OR

2. The No-Load current of a 4400/440V,1-Φ,50Hz transformer is 0.04A.It consumes power 80 W at no-load when supply is given to LVside and HVside is kept open. Calculate the following :(i)Power factor of no-load current.(ii) Iron loss component of current.(iii) Magnetizing component of current.

UNIT–II

3. In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum.

OR

4. a) Define all day efficiency of a transformer and Why transformers are rated in KVA but not in KW?

   b) The full load copper loss on the HV side of a 100 kVA, 1100/317V, single phase transformer is 0.62kW and on the LVside is 0.48kW.Calculate :(i)$R_1$and R_2inohms.ii)The total reactance is 4percent, find X_1 and X_2 in ohms if the reactance is divided in the same proportion as resistance.

UNIT–III

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

OR

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

UNIT–IV

7. A 3-phase induction motor runs at 1440 rpm at full load when supplied power from 50 Hz, 3-phase line. Calculate: (i) The number of poles. (ii) Slip of full load.
   (iii) Speed of the stator field w.r.t Stator structure and rotor structure.
   (iv) Speed of the rotor field w.r.t Stator structure and rotor structure.

OR

8. From fundamentals, deduce a relationship between Rotor power input, rotor copper loss and mechanical power developed in case of Induction motor.

UNIT–V

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

   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.

OR

10. a) Briefly explain the working of star delta starter with a neat diagram

    b) A 440V, 3-phase, 8 pole, 50 Hz, 40KW, Star connected induction motor has the following parameters.
    $R_1 = 0.1\Omega$, $X_1 = 0.4\Omega$, $R_2 = 0.15\Omega$, $X_2 = 0.44\Omega$. The stator core loss is 1250W while mechanical loss is 1000W. It draws a no load current of 20A at a p.f of 0.09 Lag. While running at a speed of 727.5 RPM. Calculate (i) Input line current &P.f. (ii) Efficiency of motor.

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Hall Ticket Number :										

R-15

Code: 5G244

II B.Tech. II Semester Supplementary 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)

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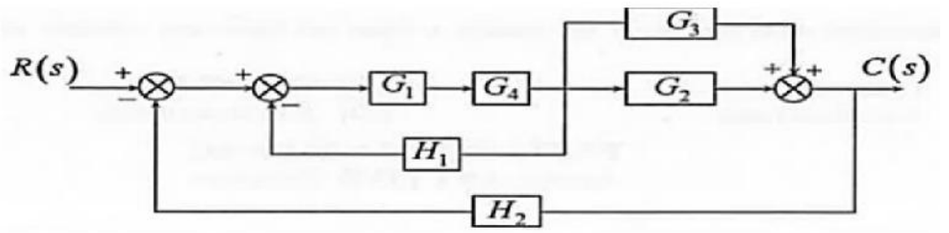
UNIT–I

1. a) Define control system. State the difference between closed loop and open control system with examples 7M

   b) Define transfer function. Find the transfer function of closed loop control system 7M

OR

2. a) Determine the closed loop transfer function of the given system using block reduction technique.



8M

   b) Describe the block diagram reduction rules with figures. 6M

UNIT–II

3. Derive the time domain specifications of a second order system 14M

OR

4. a) Derive the response first order system with unit ramp input 7M

   b) Determine the step, ramp and parabolic error constant of unity feedback control system whose forward path transfer function is given as $G(s)=\frac{K(1+2S)(1+4S)}{S^2(S^2+S+1)}$ .Also determine steady state error. 7M

UNIT–III

5. a) Define stability, asymptotic stability and relative stability. 7M

   b) What are the difficulties in forming Routh array? Explain how to overcome. 7M

OR

6. The characteristic polynomial of a system is $s^7+9s^6+24s^5+24s^4+24s^3+24\ s^2+23s+15=0$. Determine the location of the roots in s-plane and hence stability of the system. 14M

UNIT–IV

7. a) Derive the frequency domain specifications of a second order system 10M

   b) List the advantages and disadvantages of Frequency response 4M

OR

8. a) Define GM & PM. 4M

   b) Explain the procedure to determine the Gain margin and Phase margin from Polar plot. 10M

UNIT–V

9. a) Derive the expression for the transfer function of a lag-lead compensator. 6M

   b) Define lag compensator and draw the Pole Zero Plot .Also state it's effects. 8M

OR

10. The open-loop transfer function of a unity feedback control system is given by $G(s)H(S)=\frac{K}{S(1+0.2S)}$. Design a suitable compensator such that the system will have Kv=2 and PM = 50^0 14M

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