Hall Ticket Number : | | | | | | | | | | |

Code: 5GC41

R-15

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Complex Variables & Special Functions

(Common to EEE and 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 $\int_0^1 \left(\log\frac{1}{y}\right)^{n-1} dy,\ (n>0)$. 6M

   b) Separate $\tan^{-1}(x+iy)$ into real and imaginary parts. 8M

OR

2. a) Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}}\,dx \times \int_0^1 \frac{1}{\sqrt{1+x^4}}\,dx = \frac{\pi}{4\sqrt{2}}$ 7M

   b) If $\tan(\theta+i\varphi)=e^{i\alpha}$, show that $\theta=\left(n+\frac{1}{2}\right)\frac{\pi}{2}$ and $\varphi=\frac{1}{2}\left\{\log\tan\left(\frac{\pi}{4}+\frac{\alpha}{2}\right)\right\}$ 7M

UNIT–II

3. a) Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin even though CR equations are satisfied thereof. 7M

   b) Find the analytic function whose real part is $\frac{\sin 2x}{\cosh 2y-\cos 2x}$ 7M

OR

4. a) Find the analytic function $f(z)=u+iv$, if $u-v=(x-y)(x^2+4xy+y^2)$ 7M

   b) Show that $u=\frac{1}{2}\log(x^2+y^2)$ is harmonic. 7M

UNIT–III

5. a) Evaluate $\int_0^{2+i}(\bar{z})^2\,dz$, along the line $y=\frac{x}{2}$ 7M

   b) Using Cauchy's integral formula, evaluate $\oint_C \frac{\sin\pi z^2+\cos\pi z^2}{(z-1)(z-2)}\,dz$, where C is the circle $|z|=3$ 7M

OR

6. a) Find the Taylor's expansion of $f(z)=\frac{1}{(z+1)^2}$ about the point $z=-i$ 7M

   b) Find the Laurents series expansion of $\frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3<|z+2|<5$ 7M

UNIT–IV

7. a) Find the residues of $f(z)=\frac{z^3}{(z-1)^4(z-1)(z-3)}$ at its poles. 7M

   b) By integrating around a unit circle, Evaluate $\int_0^{2\pi}\frac{\cos 3\theta}{5-4\cos\theta}\,d\theta$ 7M

OR

8. a) State and prove Argument principle. 7M

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

UNIT–V

9. a) Find the bilinear transformation which maps the points $z=1, i, -1$ onto $w=i, 0, -i$ 7M

   b) Discuss the transformation $f(z)=z^2$ maps the families of lines $x=$ constant and $y=$ constant into two families of confocal central conics. 7M

OR

10. a) Discuss the transformation $w=\cosh z$ 7M

    b) Find the bilinear transformation which maps the points $z=0, i, \infty$ onto $w=1, -i, -1$ 7M

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Hall Ticket Number :										

R-15

Code: 5G242

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Electrical 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) Distinguish the differences between Star and Delta connected 3-ph systems with current and voltage relations 7M

   b) A balanced Star connected load has an impedance of (3+J4) Ω/ph and supply voltage is 230 V; 3 ph supply. Find active and reactive powers. 7M

OR

2. a) Explain the importance of Star-Delta Transformation technique and deduce relevant conversion procedure from Star to Delta of 3-ph circuit. 7M

   b) A Three Phase 4 wire, 100 V (L-L) system is supplied to a balanced Y-connected load having impedances of (8.66+j5) Ω in each phase. Find the currents and draw the vector diagram. 7M

UNIT–II

3. a) State and Prove Initial and Final Value Theorems. 7M

   b) A half cycle sine wave form is given by V (t) = sin wt. Determine its Laplace transform. 7M

OR

4. A time dependent voltage V (t) is applied to a series R-L-C network. Find S-domain impedance and current. Assume initial condition of the voltage in inductor to be assisting the input current, draw the t-domain and s-domain circuits. 14M

UNIT–III

5. a) State the initial conditions and their significance as applied for the transient analysis of an electrical circuit. 7M

   b) A series R-L circuit is energized by a d.c.voltage of 1.0 V by switching it at t=0. If R = 1 Ω and L = 1 H, find the expression for current using differential equation approach. 7M

OR

6. To a series L-C circuit, a 50 V d.c. is applied at t = 0. Find the voltage across the capacitor at t = ∞ α. Assume zero initial condition in the circuit elements. 14M

UNIT–IV

7. Explain Even, Odd and Half wave symmetry by using relevant examples. 14M

OR

8. Find the Fourier series of saw tooth wave form. 14M

UNIT–V

9. Realise the network whose impedance is given by $Z_1(s) = \frac{s^4+10s^2+7}{s2+2s}$ 14M

OR

10. What are positive real functions? Discuss the properties of these functions. 14M

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Hall Ticket Number :										

R-15

Code: 5G345

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Electronic Circuit Theory

(Electrical & 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) Using the h-parameter model, derive expressions for Current gain (A_I), Input Impedance (Z_i), Output impedance (Z_o) and Voltage gain (A_V). 8M

   b) List the characteristics and applications of common collector amplifier. 6M

OR

2. a) Sketch the circuit of a CS Amplifier. Derive Zi, Zo and Av. 8M

   b) Explain common drain amplifier with circuit diagram. 6M

UNIT–II

3. a) Explain CE short circuit current gain and gain-bandwidth product. 8M

   b) Explain about hybrid- π conductances. 6M

OR

4. a) Write short notes on the effect of coupling capacitor on low frequency response. 6M

   b) A BJT has g_m =38m mhos, $R_{b'e}$=5.9KΩ, h_{ie}=6KΩ, $r_{bb'}$=100Ω, $C_{b'c}$=12pF, $C_{b'e}$=63pF and h_{fe}=200 at 1KHz. Calculate α and β cut off frequencies and f_T. 8M

UNIT–III

5. a) Draw the practical circuit of the Current Series Feedback Amplifier and describe the concept involved in such an amplifier? 8M

   b) An RC Coupled amplifier has a Voltage gain (A_V) of 1000, f_L=50Hz, f_H=200KHz. Find the amplifier gain, f_{LF}, f_{HF} when a negative feedback is introduced with feedback ratio of 0.01. 6M

OR

6. a) Prove that negative feedback increases the bandwidth and decreases distortion. 6M

   b) An amplifier has an open loop gain 1000 and a feedback ratio of 0.04. If the open loop gain change by 10% due to temperature find the percentage change in gain of the amplifier with feedback. 8M

UNIT–IV

7. a) State and explain the Barkhausan Conditions. 4M

   b) Draw the circuit diagram of a RC Phase Shift Oscillator using BJT. Derive the expression for frequency of oscillations. 10M

OR

8. a) What are the factors that affect the stability of an oscillator? How Frequency stability can be improved in oscillations. 6M

   b) For a Colpitts oscillator with C1=1nF, C2=99nF, L=1.5mH, L_{RFC}=0.5mH, Cc=10μF, hfe=110. Calculate the frequency of oscillations and predict the condition for sustained oscillations. 8M

UNIT–V

9. a) Explain the working of complementary symmetry class B push pull amplifier. What are its advantages? 7M

   b) How crossover distortion occurs in power amplifier. 7M

OR

10. a) What is Q factor and explain its significance. 4M

    b) Explain single tuned capacitive coupled amplifier. 10M

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Hall Ticket Number :										

Code: 5G241

R-15

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Electrical Machines-II

(Electrical & 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) Discuss the constructional features of transformers. Draw neat diagrams — 10M

   b) The number of turns on the primary and secondary windings of a single phase transformer are 350 and 35 respectively. If the primary is connected to a 2.2 kV 50 HZ supply. Determine the secondary voltage — 4M

OR

2. a) Explain the principle of operation of a single-phase transformer when it supplies lagging power factor load. Draw the phasor diagram under this condition — 8M

   b) The maximum flux density in the core of 250/3000 Volts 50 HZ single phase transformer is 1.2 webers per square meter. If the emf per turn is 8 volts, determine primary and secondary turns and area of the core — 6M

UNIT–II

3. a) With all necessary instruments draw a neat experimental set up to conduct OC and SC tests on a single phase transformer — 7M

   b) A three phase transformer is used to step down the supply voltage from 10000 V to 440 V. If the output capacity of the transformer is 132 kVA, find the secondary and primary currents of the transformer — 7M

OR

4. a) Define all day efficiency? Also derive the condition for maximum efficiency of a transformer — 6M

   b) In Sumpner's test on two identical transformer rated 500 KVA, 11/0.4 KV, 50 Hz, the wattmeter reading on HV side is 6 KW on rated voltage and on LV side is 15 KW when circulated full load current. Find the efficiency of each transformer on 3/4th load and 0.8 pf lagging. What will be the maximum efficiency of each transformer? — 8M

UNIT–III

5. Compare the different connections of 3-phase transformers — 14M

OR

6. a) Why should the tap changer be connected near the neutral? What about delta connected transformer? — 7M

   b) With neat phasor diagram, explain the voltage regulation of 3-phase transformer — 7M

UNIT–IV

7. a) Explain the following terms:
   (i) Maximum torque. (ii) Full load torque and (iii) Starting torque. 6M
   b) A 12-pole, 3-phase, 50 HZ, IM draws 280 Amp and 110 KW under the blocked rotor test. Find the starting torque when switched on direct rated voltage and frequency supply. Assume the stator and rotor copper losses to be equal under the blocked rotor test 8M

OR

8. a) What are the various losses in an induction motor and on what factors they depend? 7M
   b) 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 rotor field w.r.t rotor. (iv) Speed of the rotor field w.r.t stator. 7M

UNIT–V

9. a) With neat diagram explain the operation of 3-phase IM as induction generator 7M
   b) Two 50 Hz, 3-Φ induction motor having 6 and 4-poles respectively are cumulatively cascaded. The 6-pole motor being connected to the main supply. Determine frequencies of rotor currents and the slips referred to each stator field. If the set has slip of 2%. 7M

OR

10. a) Explain in detail about the working of rotor rheostat starter with a suitable diagram. 7M
    b) The rotor of 3-phase slip ring induction motor has an induced voltage of 120 V and impedance of 0.23 + j14 ohm at stand still. The induction motor has full load slip of 0.04 driving constant torque load and running at 1340 rpm. Calculate the voltage to be injected if the motor is to be driven at 1000 rpm. 7M

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Hall Ticket Number :										

R-15

Code: 5G243

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

Generation of Electric Power

(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 sources of energy. 7M

b) What is the function of electrostatic precipitator used in the chimney of a thermal power station? Explain. 7M

OR

2. a) Explain the cooling arrangement used in the thermal power station. 7M

b) Write the advantages and disadvantages of thermal power station. 7M

UNIT–II

3. a) What are the factors of selection of the site for hydro electric stations? 7M

b) With neat sketch explain the operation of Runoff river plant. 7M

OR

4. Explain the block diagram of Gas power plant and write the function of each Component. 14M

UNIT–III

5. a) What is meant by chain reaction in nuclear power plant Also explain the process of nuclear fission. 7M

b) Explain the working of boiling water reactor with a neat diagram and also discuss its advantages and disadvantages. 7M

OR

6. Draw the schematic diagram of Nuclear Power Plant. State factors to be considered for selection and of site for the Nuclear Power Plant. 14M

UNIT–IV

7. a) Explain integrated load duration curve. 7M

b) The maximum demand on a power station is 100MW. If the annual load factor is 40%, calculate total energy generated in a year. 7M

OR

8. a) Briefly explain how “Two part tariff is most justified.” 7M

b) A consumer has an annual consumption of 176400 KWh. The change is Rs150/- per KW of maximum demand plus 15 paise per KWh. Find the annual bill if the load factor is 40%. 7M

UNIT–V

9. a) What is the importance of solar power in the present energy crisis in the world? 7M

b) Explain the principles of bio-conversion. 7M

OR

10. a) Explain the operation of Geothermal power generation. 7M

b) Explain about (a) MHD generators (b) Fuel Cells. 7M

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Hall Ticket Number :										

R-15

Code: 5G244

II B.Tech. II Semester Regular & Supplementary Examinations May 2018

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) What is the classification of control systems and discuss the importance of mathematical modeling of a control system 7M

b) Explain the necessity and effect of feedback in control system? 7M

OR

2 a) Write the block diagram reduction rules with suitable examples. 7M

b) Derive an expression for the transfer function of an AC servo motor. 7M

UNIT–II

3. a) A unity feedback system has $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$ Determine i) type of the System (ii) All error coefficients.(iii) Error for ramp input with magnitude 4 10M

b) How damping ratio affects the time response of second order system? 4M

OR

4. a) The open loop transfer function of unity feedback system is $G(s) = \frac{4}{s(s+1)}$ Determine the nature of the closed loop system. Also determine the rise time, peak time and peak overshoot. 7M

b) Derive the expression for settling time? 7M

UNIT–III

5. a) What are the limitations of Routh's criteria. Illustrate with an example. 4M

b) For the system whose characteristic equation is given by $F(s) = s(s+5)(s+6)(s2+4s+25) + K(s+3) = 0$ Determine the values of K which will cause sustained oscillations in the closed loop using Routh Criteria. 10M

OR

6. 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

UNIT–IV

7. a) Derive the correlation between time domain and frequency domain specifications. 4M

b) Sketch the Bode plot and determine the Gain Margin and Phase Margin for the transfer function given by $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$ 10M

OR

8. a) List the advantages and disadvantages of Frequency response methods. 4M

b) Sketch the polar plot and discuss the stability of the system represented by

$$G(s)H(s) = \frac{K}{s(s+1)(s+5)}$$

10M

UNIT–V

9. a) Derive the expression for the transfer function of a lag-lead compensator. 7M

b) Explain the design procedure of lag compensator. 7M

OR

10. a) List the properties of State Transition Matrix. 7M

b) Explain the controllability and observability with an example 7M

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