

Hall Ticket Number :

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R-11 / R-13

Code: 1G241

II B.Tech. II Semester Supplementary Examinations October 2020

Electrical Machines-II

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Define a transformer? Why the transformer core is laminated?
b) An 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary, transformation ratio and turns ratio.
2. a) What are the various losses taking place in transformer? How these losses can be minimized?
b) 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 LV side and HV side is kept open. Calculate the following : (i) Power factor of no-load current. (ii) Iron loss component of current. (iii) Magnetizing component of current.
3. Obtain the approximate equivalent circuit of a 200/2000V single-phase 30kVA transformer referred to 200 V side using the following test results:
OC test on LV side: 200V, 6.2 A, 360 W
SC test on HV side: 75 V, 18 A, 600 W.
4. Explain the Scott connection of three phase transformer with neat diagram.
5. Describe the constructional details of cage and wound rotor induction machines.
6. While drawing an useful power of 24KW to the full load. A 3-phase, 415V, 50 Hz, 8 pole Star connected Induction motor draws a line current of 57A. It runs at a speed of 720RPM. The power factor of the motor is observed to be 0.707 lagging. Stator resistance/ph is 0.1 Ω . Mechanical losses are 100W. Calculate (i) Shaft torque, Gross torque and lost torque (ii) Rotor input, rotor copper losses and gross mechanical power developed (iii) Stator iron and stator copper losses (iv) Rotor efficiency and Overall efficiency of motor.
7. a) List out the types of starters used for starting of 3 – phase induction motors. Explain line starting of an induction motor.
b) A 3-phase cage induction motor has a short circuit current equal to 5 times the full load current. Find the starting torque as the % of full load torque, if the motor is started by (i) DOL starter (ii) Star-Delta starter (iii) an Auto Transformer starter with X% tapping. Starting Current in (iii) is to be limited to 2.5 times the full load current. Full load slip is 4%.
8. Explain the rotor rheostat control of 3-phase slip ring induction motor.

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations October 2020

Mathematics-III

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

1. a) Prove that $B(m,n) = \int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx$ 7M
 b) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cot \theta} d$ 7M
2. a) Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \text{Real } f(z)^2 = 2 f(z)^2$, Where $f(z)=w$ is analytic. 7M
 b) If $f(z) = u+iv$ is an analytic function and $u - v = \frac{\cos x + \sin x - e^{-y}}{2 \cos x - e^{-y} - e^y}$, Find $f(z)$ subject to the condition $f\left(\frac{\pi}{2}\right) = 0$. 7M
3. a) Separate the real and imaginary parts of (i) $\tan z$, (ii) $\operatorname{sech} z$ 7M
 b) Find all roots of the equation $\tanh z + 3 = 0$ 7M
4. a) Evaluate $\int_0^{3+i} z^2 dz$, along
 (i) The line $y = \frac{x}{3}$
 (ii) The parabola $x = 3y^2$. 7M
 b) State and prove Cauchy's theorem. 7M
5. a) State and prove Laurent's theorem. 7M
 b) Expand $f(z) = \sin z$ in Taylors series about $z = \frac{\pi}{2}$ 7M
6. a) State and prove Cauchy's Residue theorem 7M
 b) Show that $\int_0^{\pi} \frac{\cos 2\theta}{1 - 2a \cos \theta + a^2} d\theta = \frac{\pi a^2}{1 - a^2} (a^2 < 1)$ *Using residue theorem* 7M
7. a) State and prove Rouché's theorem. 7M
 b) Prove that the polynomial $z^5 + z^3 + 2z + 3$ has just one zero in the first quadrant of the complex plane. 7M
8. a) Show that the transformation $w = z^2$ maps the circle $|z - 1| = 1$ into the cardioid $r = 2(1 + \cos \theta)$ where $w = re^{i\theta}$ in the w - plane. 7M
 b) Find the Bilinear transformation that maps the points $1, i, -1$ into the points $2, i, -2$ 7M

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R-11 / R-13

Code: 1G343

II B.Tech. II Semester Supplementary Examinations October 2020

Pulse and Digital Circuits

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Define % tilt of RC circuit. Obtain the response of RC high pass circuit for a ramp input.
b) What is a Differentiator and draw the circuit diagram of a Differentiator.
2. a) Draw the circuit diagram of a DC restorer circuit with and without reference voltage and explain its operation for a sinusoidal input signal.
b) Give the importance of clamping circuits.
3. a) Draw the piecewise linear diode characteristics and explain.
b) When transistor acts as a switch? Explain.
4. a) What are the effects of commutating capacitors in a binary? Give reasons
b) Discuss self-biased binary.
5. a) Why the time base generators are called sweep circuits? Give most important applications of time –base generators.
b) Draw the circuit of UJT-time base generator and explain its operation with wave forms.
6. a) Discuss the applications of a sampling gate.
b) Write about bidirectional diode sampling gate.
7. a) Discuss in detail the sine wave frequency division with a sweep circuit
b) Compare sine wave synchronization with pulse synchronization
8. a) With the help of a neat circuit diagram for NOR gate using ECL logic and explain
b) Illustrate the TTL totem pole operation of a NAND gate.
