Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31351

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Third Semester

Electronics and Communication Engineering

EC 2201/EC 32/EE 1204/10144 EC 302/080290008 — ELECTRICAL ENGINEERING

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. An 8–pole, wave–connected armature has 600 conductors and is driven at 625 rev/min. If the flux per pole is 20mWb, determine the generated e.m.f.

2. A D.C. motor operates from a 240 V supply. The armature resistance is 0.2 Ω. Determine the back e.m.f when the armature current is 50 A.

3. A single – phase auto transformer has a voltage ratio 320 V:250 V and supplies a load of 20 kVA at 250 V. Assuming an ideal transformer, determine the current in each section of the winding (Primary and Secondary) and the current in the Common Part of the windings.

4. Determine the optimum value of load resistance for maximum power transfer if the load is connected to an amplifier of output resistance 150 Ω through a transformer with a turns ratio of 5:1.

5. A three–phase 2–pole motor is to have a synchronous speed of 6000 rev/min. Calculate the frequency of the supply voltage.

6. A stator winding supplied from a three – phase 60 Hz system is required to produce a magnetic flux rotating at 900 rev/min. Determine the number of poles.

7. Differentiate between VR Stepper Motor and SR Stepper Motor.

8. What is a fixed coil in a D.C. Machine?

9. A Transmission line 5 km long has a characteristic impedance of $800\angle 25^\circ\ \Omega$. At a particular Frequency, the attenuation coefficient of the line is 0.5 Np/km and the phase shift coefficient is 0.25 rad/km. Determine the magnitude and phase of the current at the receiving end, if the sending end voltage is $2.0\angle 0^\circ$ V r.m.s.

10. A Power of 2000MW is to be transmitted from a super thermal Power station in Central India over 800 km to Delhi. Use 400 kV and 800 kV alternatives. Suggest the number of circuits required with 50% series capacitor compensation and calculate the total power loss and loss per km.

PART B — (5 × 16 = 80 marks)

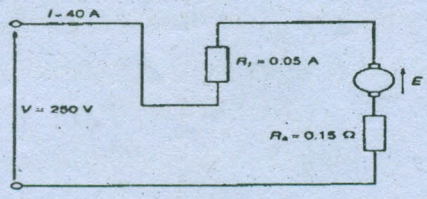
11. (a) A series motor has an armature resistance of 0.2 Ω and a series field resistance of 0.3 Ω. It is connected to a 240 V supply and at a particular load runs at 24 rev/s when drawing 15A from the supply.

(i) Determine the generated e.m.f. at this load.

(ii) Calculate the speed of the motor when the load is changed such that the current is increased to 30A. Assume that this causes a doubling of the flux.

Or

(b) A 250 V series motor draws a current of 40A. The armature resistance is 0.15 Ω and the field resistance is 0.05 Ω. Determine the maximum efficiency of the motor shown below.



12. (a) A 400 kVA transformer has a primary winding resistance of 0.5 Ω and a secondary winding resistance of 0.001 Ω. The iron loss is 2.5 kW and the primary and secondary voltages are 5 kV and 320 V respectively. If the power factor of the load is 0.85, determine the efficiency of the transformer (i) on full load, and (ii) on half load.

Or

(b) Derive the E.M.F Equation of the Transformer.

13. (a) The power supplied to a three – phase induction motor is 32 kW and the stator losses are 1200 W. If the slip is 5%, determine

(i) the rotor copper loss,

(ii) the total mechanical power developed by the rotor,

(iii) the output power of the motor if friction and windage losses are 750 W, and

(iv) the efficiency of the motor, neglecting rotor iron loss.

Or

(b) A 415 V, three – phase, 50 Hz, 4 pole, star – connected induction motor runs at 24 rev/s on full load. The rotor resistance and reactance per phase are 0.35 Ω and 3.5 Ω respectively, and the effective rotor – stator turns ratio is 0.85:1, Calculate:

(i) the synchronous speed,

(ii) the slip,

(iii) the full load torque,

(iv) the power output if mechanical losses amount to 770 W,

(v) the maximum torque,

(vi) the speed at which maximum torque occurs, and

(vii) the starting torque.

14. (a) Derive the mechanical power flow within the synchronous motor.

Or

(b) Explain the different torques of a synchronous motor.

15. (a) Explain the design of electric substation.

Or

(b) Explain the limitations of Electric Power Transmission.

———————