

“Please check whether you have got the right question paper.”

- i) Q. 1 & Q. 6 are compulsory.
- ii) Attempt any two questions from remaining questions of each section.
- iii) Assume suitable data wherever necessary

SECTION-A

- Q.1 Attempt any five 10
- a) Enlist different design circuits & Electrical machines.
 - b) What is the signification of standardization and specification in Electrical machine design.
 - c) What do you mean by gap contraction factor?
 - d) Why it is difficult to calculate mmf for air gap of a slotted machines.
 - e) What is the significance of Carter's coefficient in Electrical machine design?
 - f) What are the advantages of semi enclosed slots provided in a stator of induction motor?
 - g) Explain the significance of output coefficient in rotating machine.
 - h) What do you mean by magnetic leakage and fringing?
- Q.2 a) What do you mean by real and apparent flux density ? Derive the relation between them 07
- b) Calculate the mmf required for the airgap of machine having core length 0.32M including 4 ducts & 10 mm each, pole arc = 0.19M. slot pitch 65.4 MM slot opening 5 MM, airgap length 5 MM Flux per pole 52 mwb. Given Carter's coefficient is 0.18 for opening /gap = 1 & 0.28 opening /gap = 2 08
- Q.3 a) Explain the various factors which gives choices of stator slots in 3-ph induction motor. 07
- b) In the design of 30KW, 3ph; 440V, 50hz delta connected induction motor. Assume the specific electric loading of 23000 ac/m, specific mag loading of 0.45wb/m² full load efficiency 85 % & p.f 0.86 winding factor 0.955. Estimate the stator core dimensions, no of slots and winding turns. 08
- Q.4 a) Explain the various factors that gives the selection of rotor slots in 3-ph induction motor 07
- b) Estimate the main dimensions, air gap length no of stator slots; turn per phase and cross sectional area of stator conductor for 3-ph, 20 Hp, 400 v, 6 pole, 50 Hz, 970rpm induction motor suitable for star/delta starting. Assume $B_{av} = 0.45 \text{ wb/h}^2$. $a_c = 23000 \text{ ac/m}$ full load efficiency 0.88 and pf=0.89. 08
- Q.5 Solve any three 15
- a) Choice of air gap length in induction motor
 - b) Different species of computer aided design of rotating machine.
 - c) Design of ending of sq. cage induction motor.
 - d) Calculations of mmf for iron Dath.
 - e) Limitations in the design of Elestrical machines

SECTION-B

- Q.6 Attempt any five 10
- Define heating and cooling time constant .
 - Give two comparisons of Distribution & power transformer .
 - What is the significance of window space factor in transformer ?
 - Enlist the various cooling methods of transformer .
 - The ratio of full load current to full load current in 400 KVA , 50 Hz , 1 – phase transformer is 2.4×10^{-6} . Calculate value of constant K.
 - Explain the advantages of stepped core used in transformer .
 - Enlist the different types of winding provided in transformer .
 - Explain the causes of temperature rise in transformer
- Q.7 a) Derive the output equation of 3-ph transformers . 07
- b) A 3-ph , 50 Hz , oil cooled core type transformer Has following dimensions . 08
- Distance between core centres =0.2m
 Height of window =0.24 m
 Dia of circumscribing circle =0.14 m
 $B_m=1.25 \text{ wb}/M^2$
- $$\delta = 2.5 A /MM^2$$
- Estimate the KVA rating .
 Assume $K_w =0.2$, $A_i =0.56d^2$ for 2 stepped core .
- Q.8 a) What is the significance of constant K in transformer ? Show that $E_t = K\sqrt{KVA}$. 07
- b) A 250 KVA, 200v/ 400 v ,50Hz ,1-phase core type power transformer with following data $E_t =15v$ 08
 $B_m=1.25 \text{ wb}/m^2$; $\delta = 2.75A / mm^2$, $K_w =0.3$, $\frac{H_w}{W_w} = 3$
 Determine the main dimensions & core and yoke .
- Q.9 a) Explain in detail various cooling methods provided for cooling of different types transformer 07
- b) Derive the expression for calculation of total no of cooling tubes provided on transformer tank . 08
- Q.10 Attempt any three 15
- Explain Evaluation of resistance in transformer .
 - Explain the choice of max flux density on & current density on design of transformer .
 - Explain the conservator & breather with diagram .
 - Explain the design of choke .
 - Explain the Development of various forces in transformer under short ckt condition .