

**B. Tech. 3rd Semester (EE) F- Scheme
Examination, December – 2016
ELECTRICAL MACHINE-I
Paper-EE-207-F**

Time allowed : 3 hours] [Maximum marks : 100

Note : Question No. 1 is compulsory and attempt any one question from each of four sections.

1. (a) Why compensating winding is used in DC generator ?
- (b) Describe Zig Zag connection in transformer.
- (c) What do you understand by self excitation mode of dc machine ? Name two machines working in this mode.
- (d) Draw and explain approximate equivalent circuit diagram for an auto transformer.
- (e) Why it is not advisable to fully load a dc shunt generator until its voltage builds up to the rated value ?

Section-A

2. (a) Explain open circuit test and short circuit test for transformer.
- (b) Explain the principle of the operation of transformer. Draw the phasor diagram for transformer on no load.

(2)

24026

3. (a) Define transformer efficiency as a function of load. Develop the expression for the same.
(b) Draw the equivalent circuit of a single phase transformer and derive expressions for all its parameters.

Section-B

4. (a) Explain Tap changing transformer.
(b) Give the merits and demerits of a delta/star connected three phase transformer.
5. (a) State the necessary conditions for satisfactory operation of two transformer in parallel. Derive expression for the load shared by two transformers in parallel, when the voltage ratios are equal.
(b) Explain different connection for conversion of 3 phase to 2 phase in transformer.

Section-C

6. (a) Illustrate with suitable diagrams the patterns of (i) lap winding (ii) wave winding of the armature of a dc machine. Explain merits applications of these windings.
(b) With a suitable diagram, give the constructional features of dc machine. Explain working of commutator.

(3)

24026

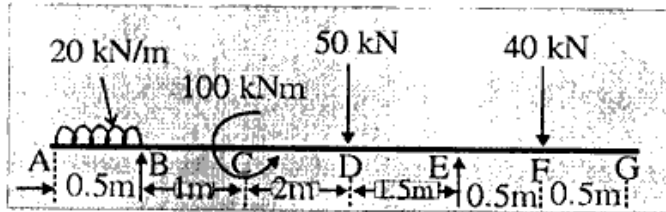
7. (a) A 4 pole dc generator with 1200 conductors generates 250V on open circuit, when driven at 500 rpm. The pole shoes have a Bore of 35cm and ratio of pole arc to pole pitch is 0.7 while the length of pole shoe is 20 cm. Find the mean flux density in the air gap.
(b) Explain the armature reaction in a dc motor, indicating also a few remedies to its adverse effects.

Section-D

8. (a) Explain speed-current, torque-current and speed-torque characteristics of dc series motor.
(b) Describe different methods for speed control of DC shunt motor.
9. (a) Why is electric braking of electric motors superior to mechanical braking? How is dynamic braking of DC shunt motor done?
(b) Derive efficiency equation of DC motor.

(4)

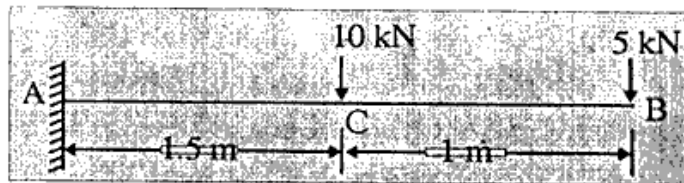
8. Construct the bending moment and shearing force diagram for the beam as shown in Fig. 1.2



20

Fig. 1.2

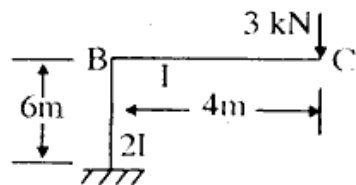
9. (a) Determine the slope and deflection at the free end of a cantilever beam as shown in Fig. 1.3 by moment area method (Take $EI = 3000 \text{ kNm}^2$)



10

Fig. 1.3

- (b) Using method of virtual work, find the horizontal deflection of the free end of the frame shown in Fig. 1.4. $E = 250 \text{ KN/mm}^2$, $I = 40 \times 10^6 \text{ mm}^4$



10

Fig 1.4

B.Tech. 3rd Semester (Civil. Engg.) F Scheme
Examination, December-2016

STRUCTURAL ANALYSIS-I

Paper-CE-201-F

Time allowed : 3 hours / [Maximum marks : 100

Note : Q. 1 is compulsory. Students have to attempt five questions in total at least one question from each section. All questions carry equal marks.

1. (i) Define Modular ratio. 10×2=20
 - (ii) What is Williot's diagram ?
 - (iii) What is meant by Muller-Breslau's principle ?
 - (iv) What do you mean by Mohr's correction ?
 - (v) Define relation between E, C and K.
 - (vi) Define Maxwell law of reciprocal theorem.
 - (vii) Define end conditions of the column.
 - (viii) Define Virtual displacement and Virtual Work done.
 - (ix) Define principle stresses and principle strains.
 - (x) Differentiate between determinate and Indeterminate Structure.
2. Three parallel wires in the same vertical plane jointly support a load of 15 KN. The middle wire is of steel

(2)

24064

and is 1 m long, while the outer ones of brass, the length of each being 1.05. The area of cross-section of each wire is 200 mm^2 . After the wires have been so adjusted as to carry one-third of the load, a further load of 35 kN is added. Find the stress in each wire and fraction of the whole load carried by the steel wire. 20

3. A point in a strained material is subjected to stresses as shown in Fig. 1.1. Using Mohr's circle method, determine the normal and tangential stresses across the oblique plane. Check the answer analytically. 20

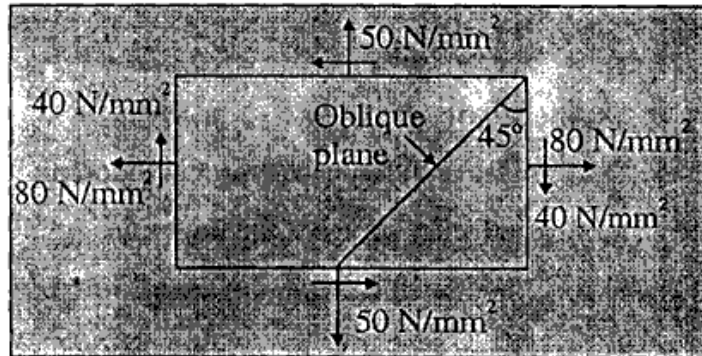


Fig. 1.1

4. (a) A rectangular beam 300 mm deep is simply supported over a span of 5 metres. Determine the uniformly distributed load per metre which the beams may carry, if the bending stresses should not exceed 120 N/mm^2 . Take $I = 8 \times 10^6 \text{ mm}^4$.

(3)

24064

- (b) Find the maximum shear stress induced by a load of 4 kN in the vertical section of a hollow beam of a square section if the outside width is 10 cm and thickness of materials is 2 cm. 10

5. A hollow shaft, having an internal diameter 40% of its external diameter, transmits 575.8 kW power at 100 r.p.m. Determine the external diameter of the shaft if the shear stress is not to exceed 60 N/mm^2 and the twist in a length of 2.5 m should not exceed 1.3 degree. Assume maximum torque = 1.25 mean torque and modulus of rigidity = $9 \times 10^4 \text{ N/mm}^2$. 20
6. Determine the maximum stress induced in a horizontal strut of length 3.5 m and rectangular cross-section 45 mm wide and 85 mm deep when it carries an axial thrust of 150 kN and a vertical load of 9 kN/m length. The strut is having pin joints at its ends. Take $E = 210 \text{ GN/m}^2$. http://haryanapapers.com 20
7. A steel tube having 75 mm outer diameter, 68 mm inner diameter and 4.8 m long is used as a strut with both ends hinged. The load is parallel to the axis of the strut but is eccentric. Find the maximum value of eccentricity so that crippling load on strut is 75% of the Euler's crippling load. Take $E = 210 \text{ GN/m}^2$ and yield strength 330 MN/m^2 . 20