CBCS Scheme

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15EE651

Sixth Semester B.E. Degree Examination, June 2018

(ELECTRICAL & ELECTRONICS ENGINEERING)

COMPUTER AIDED ELECTRICAL DRAWING

Time: 3 Hours **Max. Marks: 80**

Instruction:

1. **Answer Question 1 or 2 and 3 from PART-A.**
2. **Answer Question 4 or 5 from PART-B.**
3. **Use of CAD tool that satisfies that requirement of the syllabus is permitted. Suitable data may be assumed if not given.**

PART - A

1. Draw the armature winding of a DC machine with 4 poles, 14 slots, double layer progressive lap winding. Show on the developed winding diagram, the poles, polarity of poles, direction of rotation of the armature, direction of Emf induced/current in the conductors, sequence diagram, and position & polarity of brushes. **(25 Marks)**

OR

2. Draw the developed winding diagram of an AC machine having the following details.
   Speed = 3000 rpm No of slots = 24 Frequency = 50 Hz
   No. of Phase = 3 Phase spread: 60^0 Phase sequence: RYB
   Type of Winding = double layer,
   Lap short pitched by 1 slot connected in star. **(25 Marks)**

3. Draw the single line diagram using ISI symbols, for a 110kV / 11kV MUSS with the following data:
   110kV incoming lines, Two
   Line OCB's 110 kV, Two
   Transformer 110kV/11kV, Two
   L.T OCB's for transformer, Two
   Duplicate bus bars on H.T & L.T sides
   Bus coupler on H.T side only
   Feeders 11 kV, Six
   L.T circuit breaker for feeders, Six
   Earthing switch at incoming lines, Two
   Wave trap at incoming lines, Two
   Coupling condenser (C.C) at incoming lines, Twostation supply transformer 11kV/415kV
   Show the positions of CT, PT, Isolating Switches, Lightning arrestors, circuit breakers.
   (15 Marks)

PART – B

4. Draw the following views of a 3 phase, core type, 250kVA, 11kV/400V transformer:

   a) Front elevation right half in section
   b) Plan right half in section

   Dimensions of core and winding details are given below:

   Core: 3 stepped

   Diameter of circumscribing circle = 24 cm
   Distance between adjacent core centers = 42.5 cm
   Height of the yoke = 25 cm
   Total height of the transformer = 100 cm

   LV winding: Outer diameter of LV coil = 28.3 cm
   Inner diameter of LV coil = 25 cm
   Height of LV winding = 43.5 cm
   Number of turns per phase = 12

   HV winding: Outer diameter of HV coil = 41.5 cm
   Inner diameter of HV coil = 34.3 cm
   Height of HV winding = 43.5 cm
   Number of turns per phase = 572 **(40 Marks)**

OR

5. Following are the details of a main pole of a DC machine. Draw to suitable scale
   a) Elevation with right half in section
   b) Plan with right half in section
   Number of poles- 4
   Height of pole-140mm
   Width of the pole-127mm
   Length of the pole -170mm
   Armature diameter-400mm
   Pole arc/ pole pitch =0.67
   Number of turns per pole -1890
   Conductor area -1.77mm2
   Depth of the winding-45mm
   Height of the winding-110mm
   (Missing data may be proportionally assumed) **(40 Marks)**

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Karnatak Law Society's

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Electrical and Electronics Engineering Department

Sub: Computer Aided Electrical Drawing

Sem : VI.

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Part - A

Q 1. DC Winding Diagram.

Given Data : No. of poles = 4.

No. of slots = 14

Since winding is double layer, progressive lap

No. of conductors = 28.

$$\text{Pole pitch} = \frac{Z}{P} = \frac{28}{4} = 7.$$

$$\frac{Y_b + Y_f}{2} = \text{pole pitch} = 7.$$

$$\therefore \quad Y_b + Y_f = 14 \quad \text{---(1)}$$

$$\& \quad Y_b - Y_f = 2 \quad \text{---(2)}$$

Solving eqns. (1) & (2) we get,

$$Y_b = 8 \quad \& \quad Y_f = 6$$

But we know that Y_b & Y_f must be odd numbers.

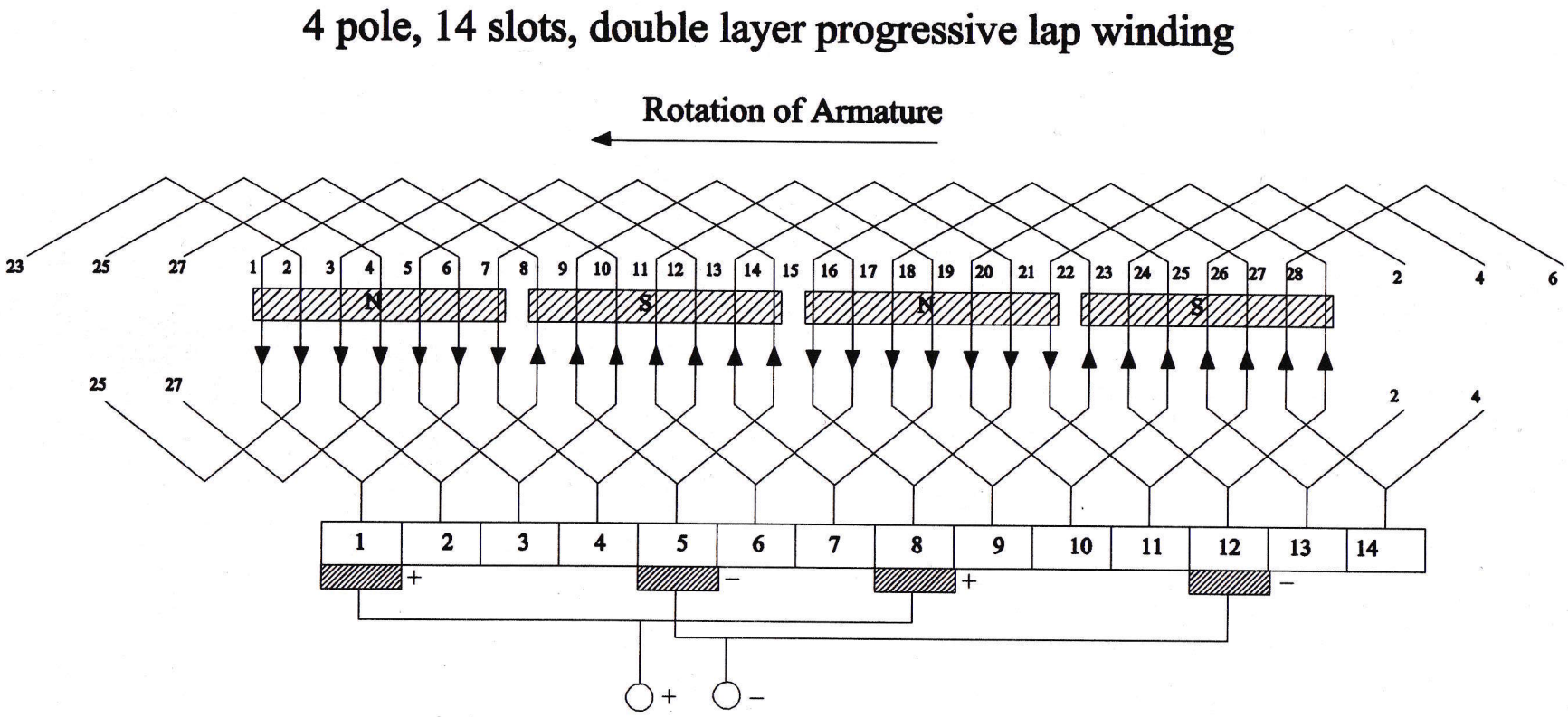
Therefore, Let $Y_b = 7$

$$\& \quad Y_f = 5$$

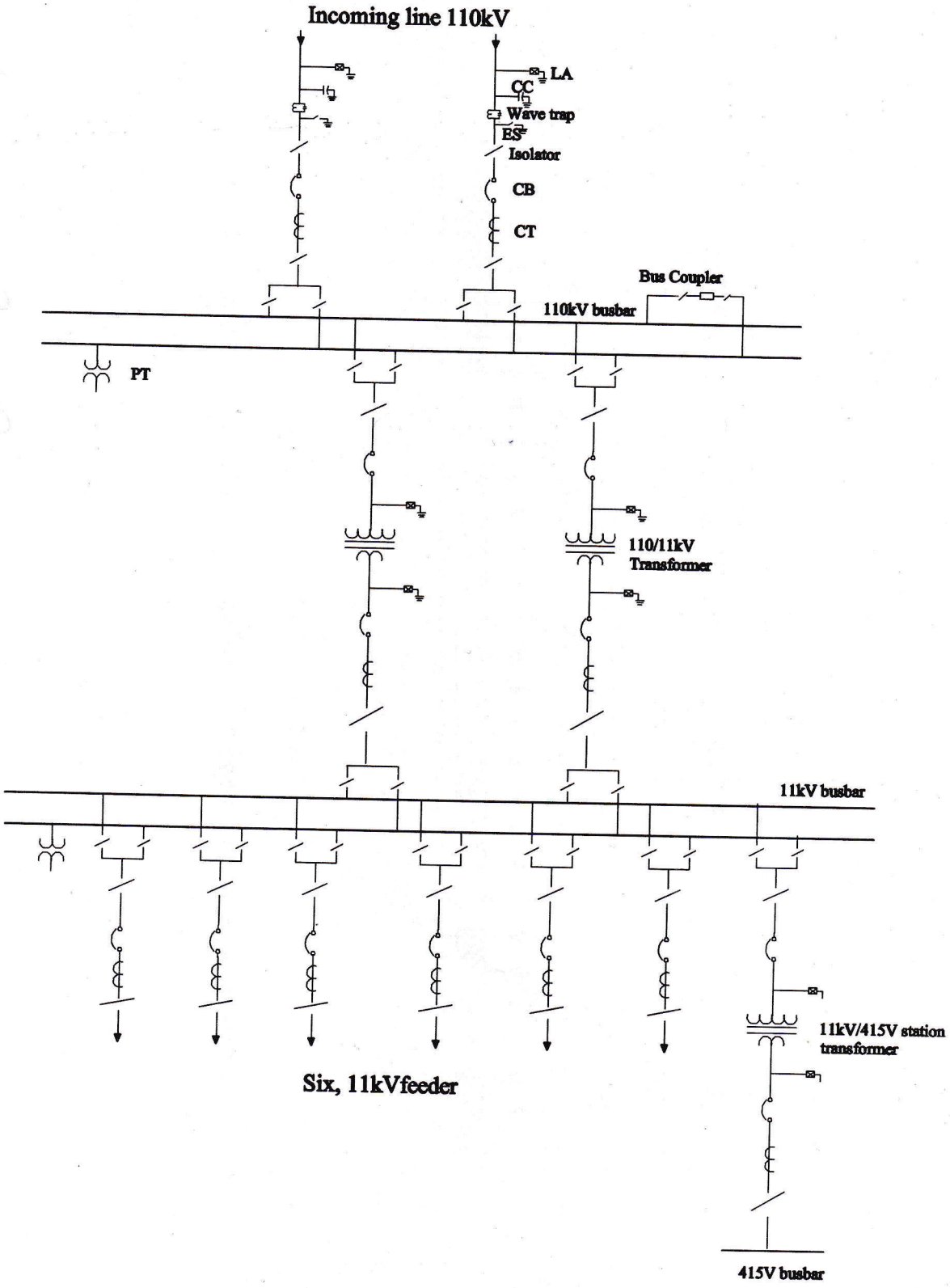
Winding Table:

Back Connection $Y_b = 7$			Front Connection $Y_f = 5$		
1 + 7	=	8	8 - 5	=	3
3 + 7	=	10	10 - 5	=	5
5 + 7	=	12	12 - 5	=	7
7 + 7	=	14	14 - 5	=	9
9 + 7	=	16	16 - 5	=	11
11 + 7	=	18	18 - 5	=	13
13 + 7	=	20	20 - 5	=	15
15 + 7	=	22	22 - 5	=	17
17 + 7	=	24	24 - 5	=	19
19 + 7	=	26	26 - 5	=	21
21 + 7	=	28	28 - 5	=	23
23 + 7	=	30 (2)	30 - 5	=	25
25 + 7	=	32 (4)	32 - 5	=	27
27 + 7	=	34 (6)	34 - 5	=	29 (1)

Q1 : Developed Winding Diagram of DC Machine.

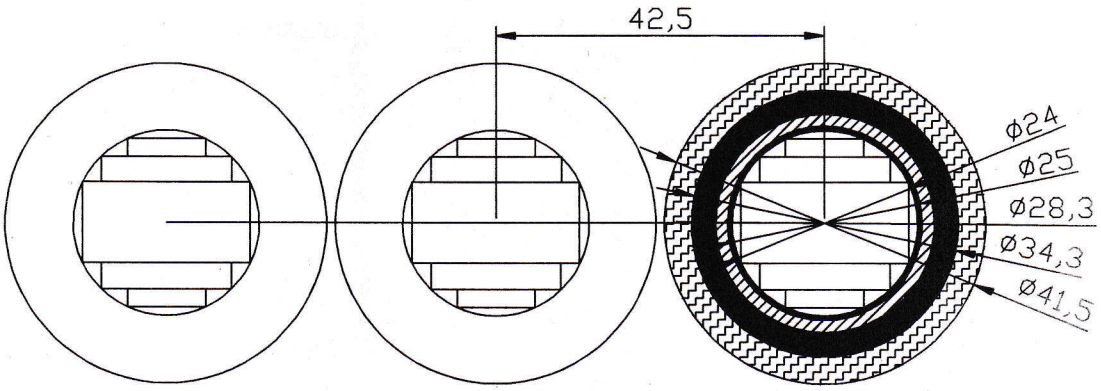


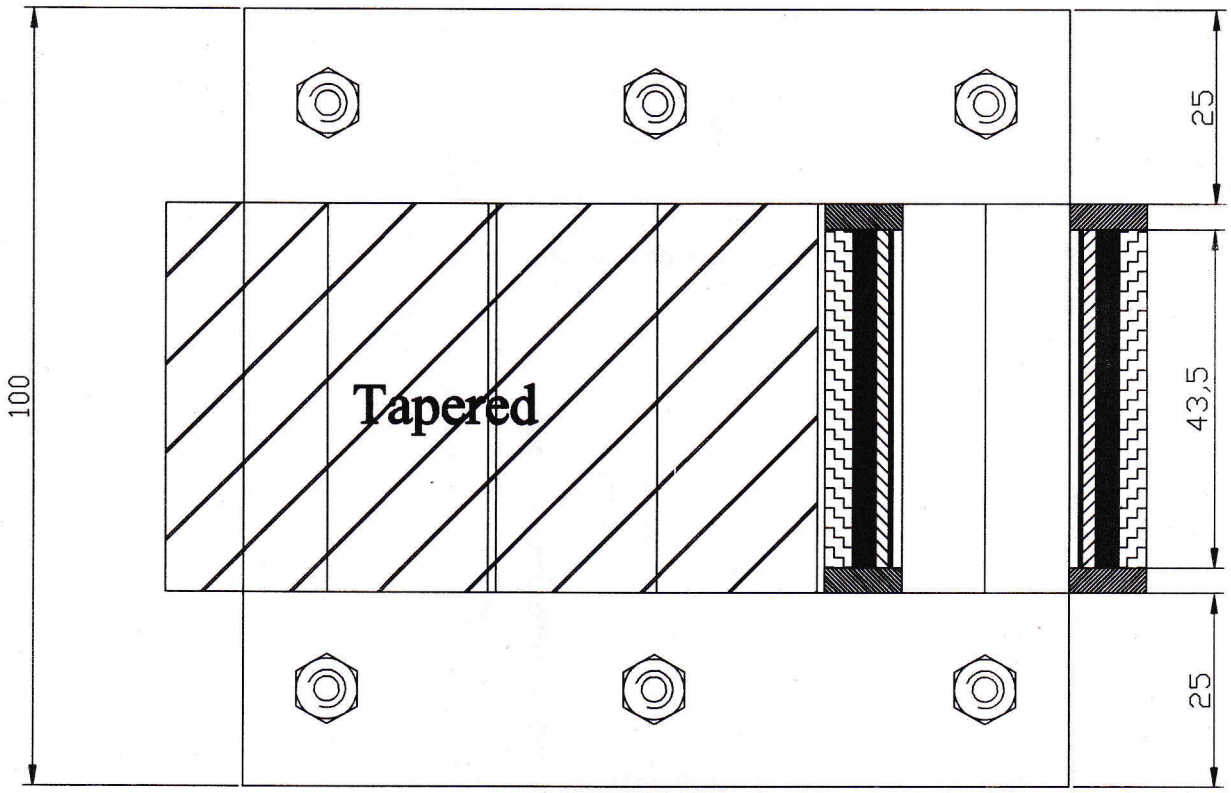
Q2: Single-line diagram of 110kV/11kV substation.



Q3: Sectional Views of 3-ϕ core-type Transformer.

Plan right half in section





Sectional Elevation right half in section

Q4: Sectional Views of Main Pole of DC Machine.