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Internal Assesment Test – 2

Sub: Computer Aided Electrical Drawing (Professional Elective)					Code: 15EE651
Date: 16/04/2019	Duration: 90 mins	Max Marks: 50	Sem: 6	Section: A & B	Batch: 1

Answer ANY One question from **Q1** and **Q2**. **Q3** is compulsory. Explain your notations explicitly and clearly. Sketch figures wherever necessary. Use AutoCAD Software for drawing. Good luck!

		Marks	OBE CO	OBE RBT
Q1.	Draw and develop a winding diagram of a dc machine with the following data: no. of poles = 4; no. of conductors = 30; double layer; simplex progressive wave.	[30]	CO1	L3
	OR			
Q2.	Develop an ac lap winding diagram for the following details: Number of phases = 3; Number of poles = 4; Number of slots = 21; Double layer; and Phase sequence = RYB.	[30]	CO1	L3
Q3.	Draw the single line diagram of a 66 kV MUSS (Master Unit Substation) with the following details: (i) 66 kV incoming lines, 2; (ii) Step down transformer 66 kV/11 kV, 2; (iii) OCB's for transformer bank on LT side, 2; (iv) Duplicate bus bars for HT and LT side; (v) Bus couplers for HT side only; (vi) Feeders. 11 kV radiating from LT bus bars, 4; (vii) LT circuit breaker for feeders, 4; (viii) position of LA, IS, CT's, PT's are to be indicated.	[20]	CO2	L3

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COMPUTER AIDED ELECTRICAL DRAWING (15EE651)

IAT 2 SCHEME OF EVALUATION

BATCH 1

Q1. $P=4$; $Z=30$; DL; $n=2$; SPW $\begin{bmatrix} N \uparrow \\ S \downarrow \end{bmatrix}$

$$Y_c = \frac{Z \pm 2x}{P} = \frac{30+2(1)}{4} = 8$$

OR

$$Y_c = \frac{C \pm x}{P}$$

$$S = C = \frac{Z}{n} = \frac{30}{2} = 15$$

$$Y_c = \frac{15+1}{2} = 8$$ – 2M

$$Y_B = Y_c \pm 1 = 8+1 = 9$$ – 2M

$$Y_F = Y_B - 2 = 9-2 = 7$$ – 2M

WINDING TABLE:

1 → (+9) → 10 → (+7) → 17 → 24

3 → 12 → 19 → 28

5 → 14 → 21 → 30

7 → 16 → 23 → 2

9 → 18 → 25 → 4

11 → 20 → 27 → 6

13 → 22 → 29 → 8

15 → 24 → 1

– 2M

POLE PLACEMENT:

$$Y_p = \frac{Z}{P} = \frac{30}{4} = 7.5$$

Length of pole:

$$\tau = Y_p \times d = 7.5 \times 10 = 75 \text{ mm}$$

$0.7\tau = 52.5$ mm;

$0.3\tau = 22.5$ mm;

$0.15\tau = 11.25$ mm – 1M

Width of pole:

$0.75\ell = 0.75 \times 50 = 37.5$ mm – 1M

Drawing in AUTOCAD: Developed winding diagram with poles, emf direction, Commutator segments, brush position and polarity – 2DM

OR

Q2. $P=4$; $S=21$; 3ϕ; DL; Lap; RYB

$$Y_p = \frac{S}{P} = \frac{21}{4} = 5.25; \quad m = S/P/ph = \frac{5.25}{3} = 1.75$$ – 1M

As m is a fraction, this is a fractional slot lap winding. Since S/P is not reducible; $P=4$

$$\frac{S}{ph} = \frac{21}{3} = 7 \quad -1M$$

	P1	P2	P3	P4
TCS	222	122	212	221
BCS	221	222	122	212

$-1M$

TCS R R B B Y Y R B B Y Y R R B Y Y R R B B Y

BCS R R B B Y R R B B Y Y R B B Y Y R R B Y Y $-1M$

	R	B	Y
Ref. Row	1-7	8-14	15-21
P1	1 5	9 13	17 21
P2	4	8 12	16 20
P3	3 7	11	15 19
P4	2 6	10 14	18

$-2M$

$$\beta = \frac{180^\circ}{S/P} = \frac{180^\circ \times 4}{21} = \frac{720^\circ}{21} \quad -1M$$

R_{St} = 1st Slot $-1M$ $\quad Y_{St} = 1 + \frac{120^\circ}{\beta} = 4.5$

$B_{St} = 1 + \frac{240^\circ}{\beta} = 8^{th}$ Slot $\quad = 1 + \frac{(120^\circ + 360^\circ)}{\beta} = 15^{th}$ Slot

$-1M$ $\quad -1M$

Drawing in AutoCAD:

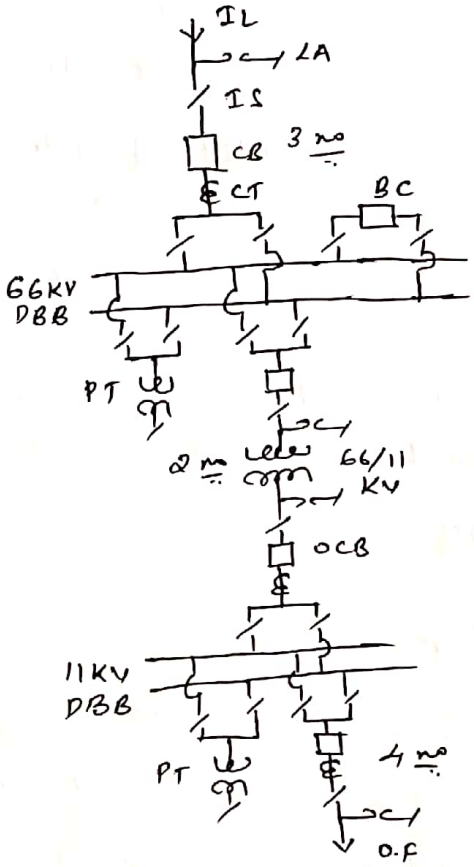
Double layer Connection in sequence $-8M$

front & back end Connections $-8M$

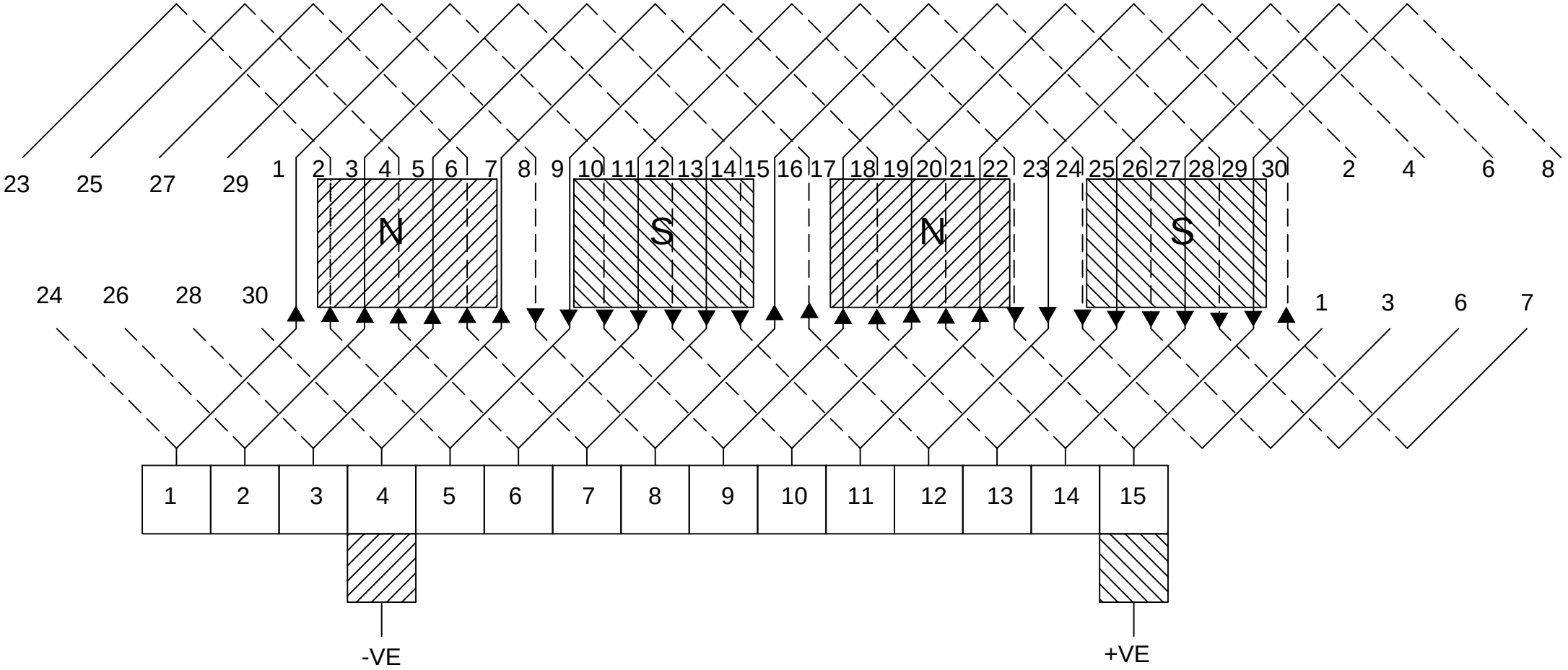
Interconnection b/w coils of same phase for all the 3 phases $-4M$ (S-S and E-E)

Q3. Rough Sketch $-6M$

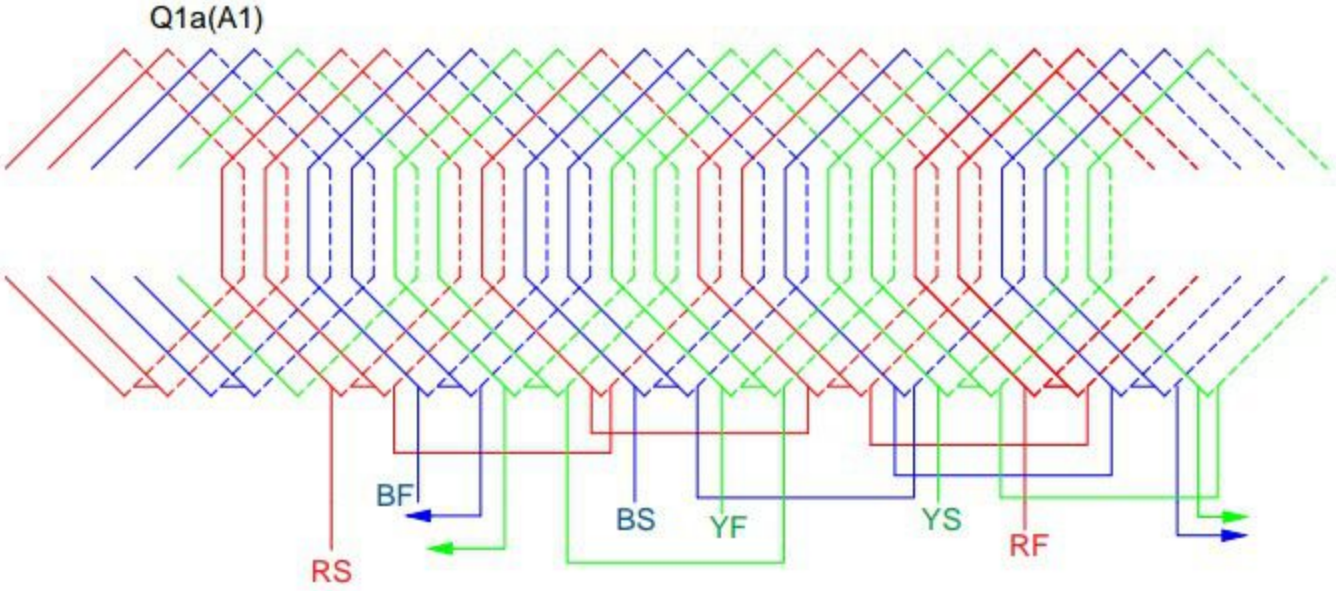
Drawing in AutoCAD: i) IL $-2M$; ii) Step down x'mer $-2M$; iii) OCB's for x'mer on LT $-2M$; iv) Duplicate busbar LT & HT $-2M$ v) BC on HT $-1M$; vi) feeder 11 kV $-2M$; vii) LT CB for feeder $-2M$ viii) position of LA, CT, PT & IS $-1M$



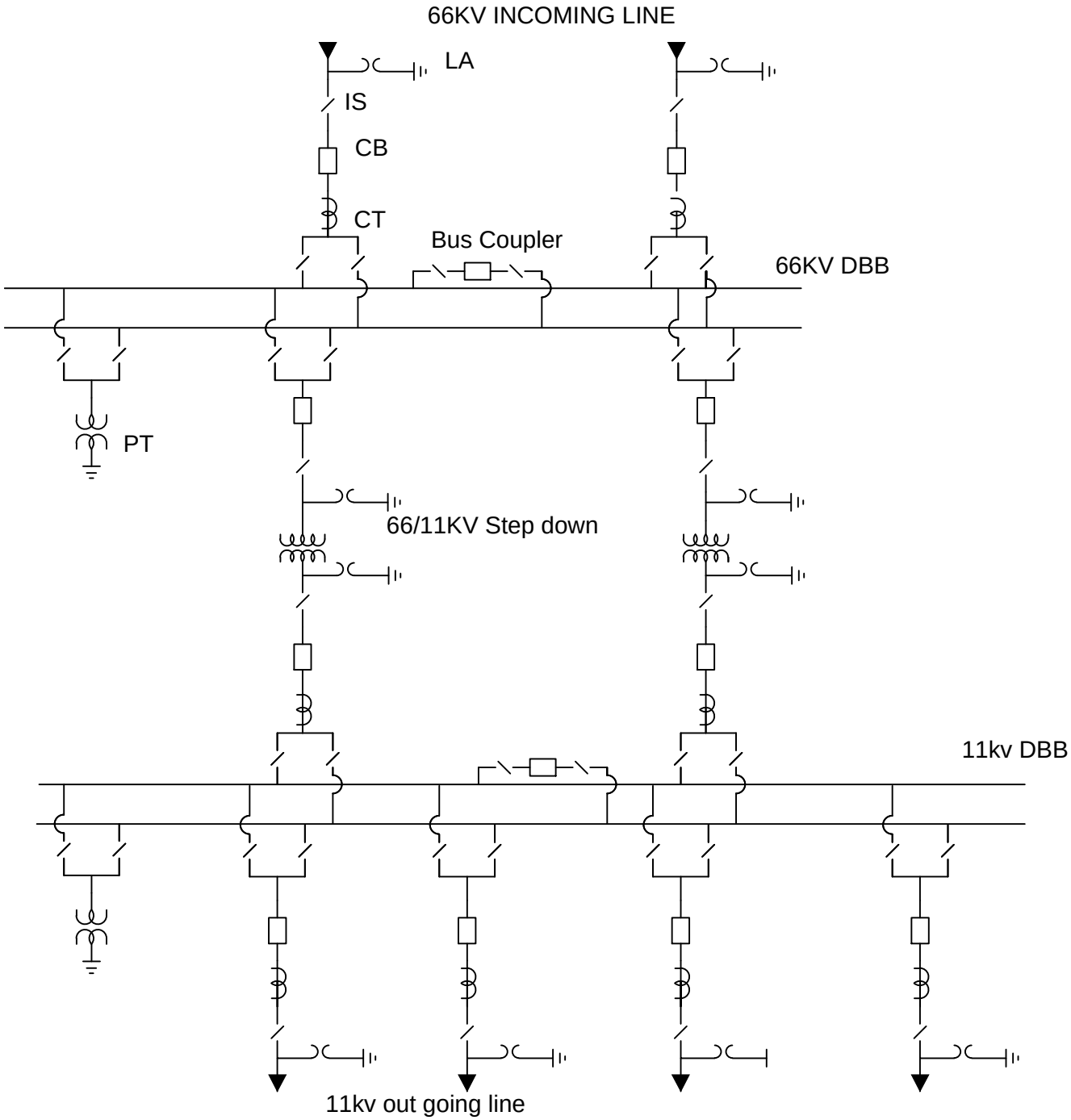
Q1.B. WAVE WINDING P=4 Z=30 DL SPW



SMITHA. B. GADAKAR
1CR15EE082


Q1a(A1)
BF
BS
YF
YS
RF
RS

A1. SLD



SMITHA B GADAKAR
1CR15EE082