B.E. (Electrical Engineering (Electronics & Power)) Semester Seventh (C.B.S.)
Electrical Installation Design

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What do you mean by TOD Tariff? Explain in details. **6**

b) A power station has the following loads : **7**
Residential Lighting Load :
    Maximum Demand = 1000 KW
      Load Factor = 20%
    Diversity between consumers = 1.3
Commercial Load :
    Maximum Demand = 2000 KW
      Load Factor = 30%
    Diversity between consumers = 1.1
Industrial Load :
    Maximum Demand = 5000 KW
      Load Factor = 80%
    Diversity between consumers = 1.2
Overall diversity factor may be taken as 1.4.
Find –
i) Maximum demand on system.
ii) Daily energy consumption of each type of load and total energy consumption.
iii) Connected load of each type, assuming the demand factor of each is 100%.

OR

2. a) Write short note on – **8**
i) Derating factor of cable.
ii) XLPE cable.

b) Explain the factors considered for selection of conductors for overhead lines. **5**

3. a) Define the following terms related to Fuse – **6**
i) Current Rating. ii) Fusing Current.
iii) Fusing factor. iv) Prospective current.
v) Cut-off current.
Also Draw cut-off characteristics of a fuse.

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b) Explain Vacuum Circuit Breaker (VCB) giving construction, principle, working and application with neat sketch. **8**

OR

4. a) What do you mean by Current Limiting Reactor? Explain in short along with its advantages & disadvantages. **6**

b) A single phase power system network is shown in fig. (a). A short circuit occurs at point F. The voltage at point F is 66 KV. Calculate – **8**

i) the fault current, without series reactor.

ii) the fault current, with series reactor.

Fig. (a)
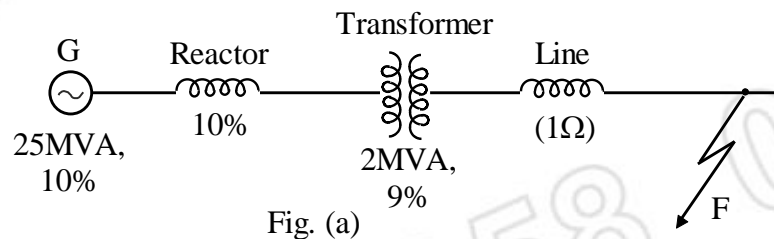
5. a) Write short note on selection of power contactors. **6**

b) A 20 HP (14.92 KW), 400 V, 950 rpm, 3ϕ, 50 Hz, 6 pole squirrel cage Induction motor with 400 V applied takes 6 times the full load current at standstill and develops 1.8 times full load running torque. The full load current is 30 A. **7**

i) What voltage must be applied to produce the full load torque at standstill?

ii) What current will this voltage produce?

iii) If the voltage is obtained by on auto-transformer, what will be the line current?

iv) If starting current is limited to full load current by an auto-transformer, what will be the starting torque as a percentage of full load torque?

Ignore the magnetizing current and stator impedance drops.

OR

6. a) What do you mean by power factor? State various disadvantages of Low power factor. **6**

b) A 3ϕ, 500 HP, 50 Hz, 11 KV star connected induction motor has a full load efficiency of 85% at lagging p.f. of 0.75 and is connected to a feeder. It is desired to correct p.f. of load to 0.9 lagging. Determine – **7**
i) the size of the capacitor bank in KVAR and
ii) the capacitance of each unit if the capacitors are connected in Delta as well as star.

7. a) Explain Ratio Test, Polarity Test and Magnetic balance test of power transformer. **7**

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b) Explain various factors for selection of Transformer. Also give steps in determining size and rating of Transformer. **6**

OR

8. a) Explain selection and Location of site for a substation. **6**

b) Explain any three important equipment of a substation. Also give sequence of operation of Isolator, circuit breaker and earting switch during opening & closing of a circuit. **7**

9. a) Explain steps in determining rating & size of transformer, C.T. and P.T. circuit breaker, power cable for an installation if demand factor and diversity factor of the system is known. **7**

b) Explain in short about motor control center specifying steps in determining selection of starter, contactor, overload & overcurrent relay setting, cable for feeding motor. **7**

OR

10. An industrial installation is divided in three load areas A, B and C. The LT loads are as under – **14**

Area A : 120 HP 3 ϕ Induction motor – 4 Nos. and

15 HP 3 ϕ Induction motor – 3 Nos.

Area B : 5 HP 3 ϕ Induction motor – 6 Nos. and

75 HP 3 ϕ Induction motor – 4 Nos.

Area C : Lighting load 3 ϕ, 20 HP – 1 No. and

Heating load, 70 KW, 3 ϕ – 1 No.

Draw the detailed single line diagram for complete installation, starting from point of tapping at 11 KV, HT metering, 11 KV Transformer substation, LT supply cable from transformer, giving details about size of cables on LT side, circuit breaker rating, C.T. and P. T. on L. T. side, relay setting on L.T. side.

Assume overall average efficiency of 85% and power factor of 0.9 lagging.

11. a) Explain fall of potential method for determining Earth Resistance of an electrodes. **6**

b) Explain the Necessity of Earthing. What is the effect of moisture and salt content in soil on Earth resistivity? Explain with neat graph. **7**

OR

12. a) What types of Interlocks are to be provided for use of energy at High and extra high voltage? **7**

b) Explain in brief – **6**
   i) Special provisions for High Rise Buildings.
   ii) I.E. Rules related to clearance of overhead lines.

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