

**Central Public Works Department**  
Departmental Examination for  
**Assistant Executive Engineer (E & M)**  
Electrical Engineering Paper –II  
(With Books)  
2021

**Time: 3 Hours**

**Maximum Marks: 100**

Note: Attempt any five questions. Assume details wherever required.

Q. 1. What should be the basis for economic comparison for equipment like transformers considering high cost of energy? Compare the economics of meeting a 100 KVA load, load factor 0.9, by a distribution type transformer which remains in operation throughout the year. Consider 2 sizes: -

- a. 125 KVA transformer under-loaded upto a 100 KVA
- b. 100 KVA transformer fully loaded upto a 100 KVA

(Marks 20)

Q. 2. Find out how much more can be paid for pump 'A' because of its higher efficiency with following details:-

Service required- To pump 3,00,000 liter of water per day against 40 meter total head from all causes.

Cost of energy:	Rs. 8 per unit
Combined efficiency of pump sets:	Pump A= 70%, Pump B = 60 %
Cost of operation and maintenance:	3% per year
Cost of Pump B:	Rs. 1,00,000/-
Minimum return expected:	10%

Also workout the total cost of pumping over entire life cycle considering 8 Hours pumping per day. Life of the pump may be assumed as 10 years.

(Marks 20)

Q.3. Prepare conduit layout, wiring diagram, and Bill of Quantity for providing Internal Electrical installation and Fans for a Type V quarter as per Scale of Amenities for Electrical (details attached).

(Marks 20)

Q.4. Design a lift system for a office building, gross area per floor 1200 sqmt, 10 floors including ground floor. 3 meter floor height, 10 sqmt per person population. It should also be suitable for physically challenged person.

Please provide the following:-

- (i) Number of lifts
- (ii) Capacity of lifts
- (iii) Speed
- (iv) Clear opening doors width of lifts
- (v) Maximum gap between lift door and building floor
- (vi) Height of control panel inside the car
- (vii) Height of the hand rails and its location
- (viii) Illumination level inside the car & outside in the floor

(Marks 20)

Q.5. Design ventilation and air conditioning system of a building having a parking basement and G+10 floors. Built up area of the basement as well as of each floor may be taken as 1000 Sq. meter. Also suggest air changes required for toilet block, conference hall and basement of the building. Make your own assumptions wherever required.

(Marks 20)

Q.6. A Multi Story office building of 25,000 Sqm. Area, 25 meter height is centrally air-conditioned. For standby power supply, DG Sets are to be installed in the basement of the building. The client department has desired the entire load to be supplied by DG sets in the event of power failure. Design and prepare scheme for execution of DG set work in the building.

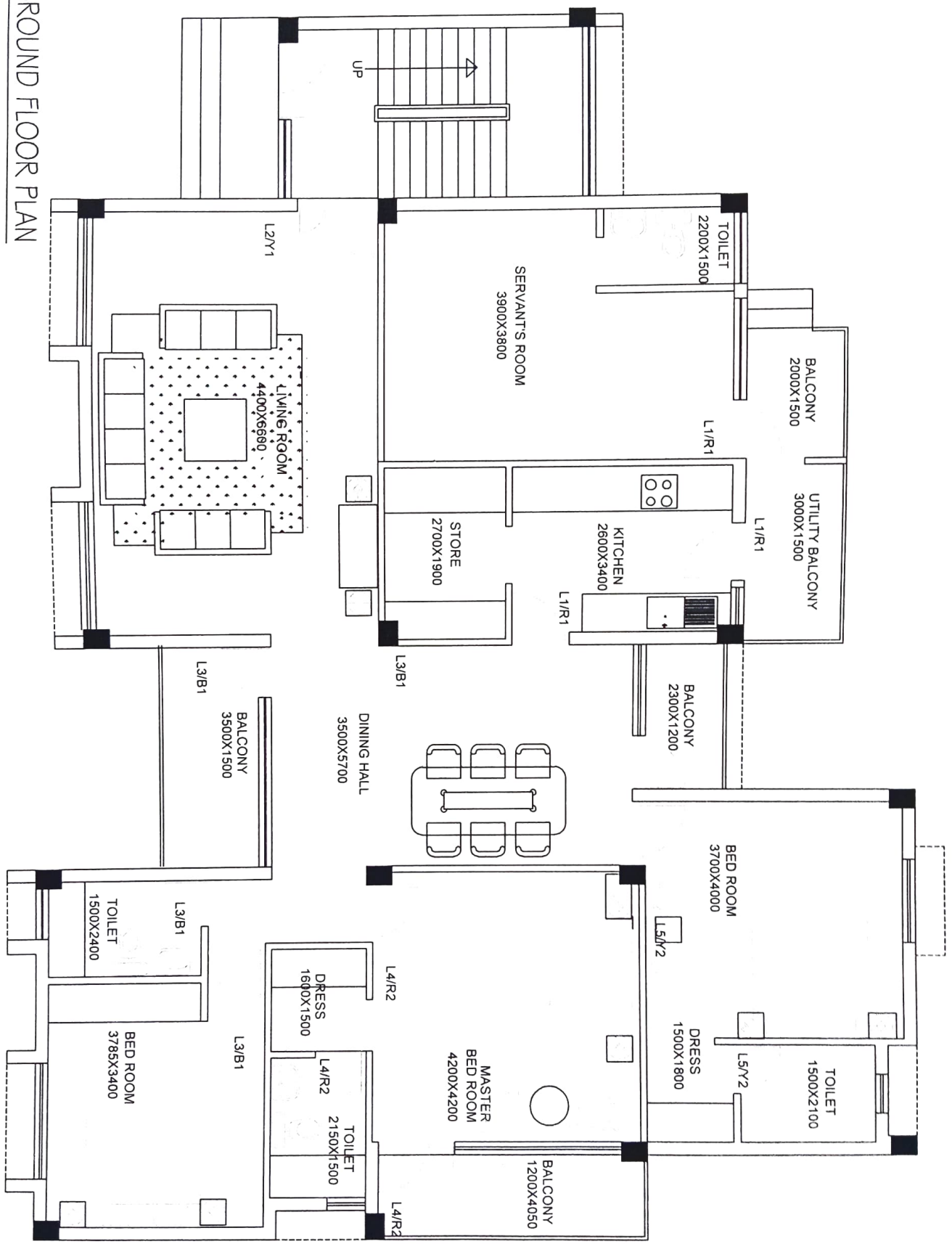
(Marks 20)

Q.7. Describe the operating principles and guidelines for installation of solar water heating system and solar photovoltaic system (SPV) in roof top of a building. What should be the space requirement for 10 KWp SPV plant? Also elaborate on orientation of the solar panels, peak sun hour and spacing for a place like Delhi.

(Marks 20)

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# GROUND FLOOR PLAN



Total Floor: G+2

### Specifications for Electrical Installation in Residential Quarters

Item No.	Description	Type I		Type II		Type III		Type IV		Type V (excluding servant quarter & Garage)		Type VI (excluding servant quarter & garage)		Servant Qtrs & Garage	
		Existing	Revised	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Revised
1.	Power Points (15 amperes , 6 pins	3	2	3	3	3	4	3	5	4	6	-	7	-	1
2.	MCB connected socket outlet for A.C. unit /Geyser complete with wiring	-	1	-	1	-	1	-	2	-	4	-	5	-	-
3.	Ceiling Fans	2	2	3	3	4	4	5	5	5	6	-	7	1	1
4.	Exhaust Fans	-	1	-	1	-	1	1	1	-	1	-	1	-	-
5.	Call bells	1	1	1	1	1	1	1	1	1	2	-	3	-	-
6.	Light Fans/Call bell/5A Plug Points	17	17	20	20	23	23	24	27	33	38	-	44	5	5
7.	F.I. Fittings excluding Tube and Starter	2	2	2	3	3	4	4	5	-	7	-	8	1	1
Type of Wiring		Recessed Conduit Type ----													
8.	EDB MCB Type	1	1	1	1	1	1	1	-	1	-	1	-	1	1
	A. Single Phase	-	-	-	-	-	-	-	1	-	1	-	1	-	-
9.	Cable TV Point	-	1	-	1	-	1	-	1	-	2	-	2	-	-
10.	Telephone Point	-	-	-	-	-	-	-	1	-	2	-	2	-	-