

KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.ARCH

Year : III

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : EEEG 331

Semester : II

F. M. : 10

Date

20 DEC 2024

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and encircle in the most appropriate option from each set of choices

1. The term "overload" in an electrical circuit refers as
 - a. Using energy efficient appliances
 - b. Overcharging a battery
 - c. Insulating electrical wires
 - d. Using too many electrical devices simultaneously
2. A switchgear is used for
 - a. Interrupting an electrical circuit
 - b. Switching an electrical circuit
 - c. Switching and controlling an electrical circuit
 - d. Switching, controlling, and protecting the electrical circuit
3. Two way switches are generally employed in
 - a. Staircase wiring.
 - b. Go-down wiring.
 - c. Hostel wiring.
 - d. Tunnel wiring.
4. In industries, the electrical appliances are connected
 - a. In series with the source.
 - b. In parallel with the source.
 - c. Come in series and some in parallel with the source.
 - d. In parallel with the source only, if it is a high power appliance.
5. A desired illumination level on the working plane depends upon
 - a. Age group observers and whether the object is stationary or moving.
 - b. Size of the object to be seen and its distance from the observers.
 - c. Whether the object is to be seen for longer duration or shorter duration of time.
 - d. All of the above.
6. If two switches are connected in series to a lamp/load, then
 - a. Any one switch need to be switched ON to energize the load
 - b. Both the switches need to be switched ON to energize the load
 - c. Only switch 1 need to be switched ON to energize the load
 - d. Only switch 2 need to be switched ON to energize the load
7. The service mains connects
 - a. Distributor and consumer terminals
 - b. Distributor and transformer
 - c. Distributor and relay system
 - d. Transformer and earth

8. The maximum limit of earth leakage current according to international standard IEC 60601-1 is
 - a. 0.2 milli ampere
 - b. 1 milli ampere
 - c. 0.4 milli ampere
 - d. 0.1 milli ampere
9. The property of an insulating material is
 - a. It prevents the unwanted flow of current
 - b. It allows the unwanted flow of current
 - c. Increases the unwanted flow of current
 - d. Decreases the unwanted flow of current
10. The service mains connects
 - a. Distributor and consumer terminals
 - b. Distributor and transformer
 - c. Distributor and relay system
 - d. Transformer and earth
11. The _____ bulbs consumes less power for light of same intensity
 - a. Incandescent lamp
 - b. Compact Fluorescent Lamp
 - c. Light Emitting Diode bulb
 - d. Fluorescent lamp
12. The lamp with the best color rendering index (CRI) is
 - a. Fluorescent
 - b. Incandescent
 - c. Light Emitting Diode
 - d. High Pressure Sodium Vapour
13. For major reading purpose, the illumination level required is _____ Lumens/square meter.
 - a. 20-40
 - b. 60-100
 - c. 200-300
 - d. Above 500
14. Candela is the unit of
 - a. Luminous flux
 - b. Luminous effect
 - c. Luminous pressure
 - d. Luminous intensity
15. Which of these is not a part of distribution system?
 - a. Feeders.
 - b. Distributors.
 - c. Service mains.
 - d. Transmission lines.
16. The maximum load permitted in a power circuit as per Nepal Building Code 207 is
 - a. 5000 Watts.
 - b. 3000 Watts.
 - c. 2000 Watts.
 - d. 10000 Watts.
17. The short circuit current rating of a 16 Ampere, 'C' type MCB is approximately
 - a. 16 Ampere.
 - b. 10 kilo Amperes.
 - c. 100 kilo Amperes.
 - d. 16 times the rating.
18. A lamp takes 10 Amperes at 250 Volts and emits 16000 lumens. The mean spherical candle power is
 - a. 8000π .
 - b. 2000π .
 - c. 4000π .
 - d. $4000/\pi$.
19. For the same lumen output, the running cost of the fluorescent lamp is
 - a. Equal to that of the filament lamp.
 - b. Less than that of the filament lamp.
 - c. More than that of the filament lamp.
 - d. Any of the above.
20. In case of _____ least illumination is required.
 - a. Skilled bench work.
 - b. Drawing offices.
 - c. Hospital wards.
 - d. Fine machine work.

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Level : B.ARCH
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Time : 2 hrs. 30mins.

20 DEC 2024

Course : EEG 331
Semester : II
F. M. : 40

SECTION "B"

[4 Q. × 10 = 40 marks]

Attempt ANY FOUR questions. Assume any suitable data if required.

1. A pharmaceutical area to be lighted is as follows: [10]
- Type of building category: Industrial
 - Area/activity: assembly, moderately difficult
 - Average age of workers: 35 years
 - Demand for speed and accuracy: Important
 - Task background reflectance: 41%
 - Size of room: 65ft x85 ft, 30 ft ceiling
 - Height of work plane=5 m
 - Reflectance factors: Ceiling 70%, Walls 50%, Floor 20%
 - Ballast factor= 0.96
 - Luminaire type: 3
 - Luminaire mounting: suspended 6.0 ft
 - Lamps: 800 mA, 96 in., T-12,CW, rapid-start fluorescent
 - Atmosphere: Medium
 - Interval between cleaning: 30 months
- Calculate the theoretical number of luminaires required to light the industrial area and unit power density.

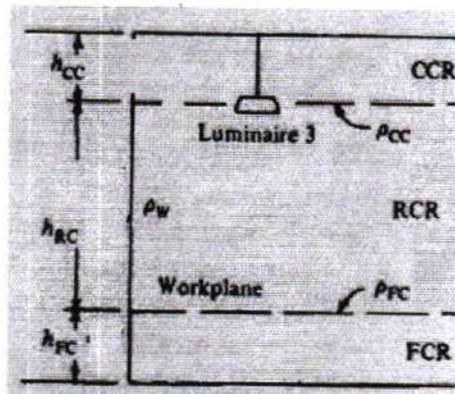


Figure 1. Question 1

- 2.
- a. Explain the difference between the terms quantity and quality in regards to lighting considerations. Elaborate the difference between luminous exitance and luminance. What is the significance of an intensity distribution curve? Why do luminance ratios affect the quality of lighting? [5]
 - b. List out the six classifications of luminaires according to their distribution pattern. Why are systems that use indirect luminaires generally the least efficient? [5]

P.T.O.

3.

- a. Explain the types of protection devices employed in the residential distribution system. [4]
- b. The layout plan for a single floor resident is shown in Figure 2. Prepare a light layout plan indicating switch location, power layout plan, and single line diagram showing arrangement of miniature circuit breakers (MCB's) for protection. [6]

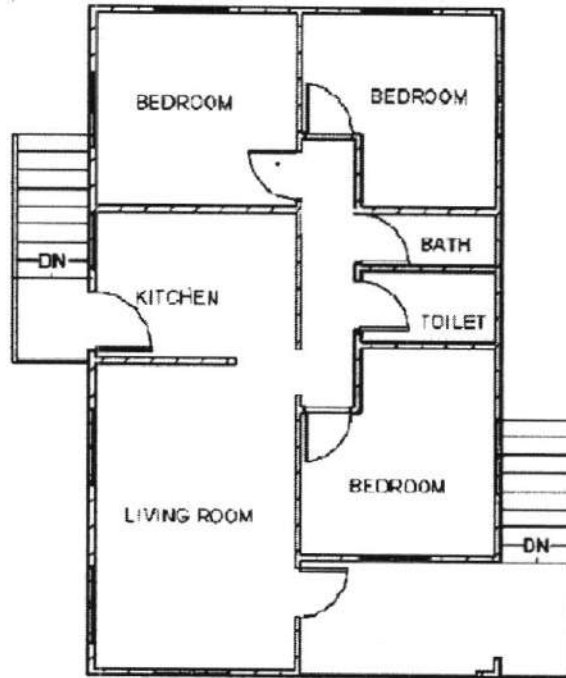


Figure 2 Floor plan for question 5b

4.

- a. The main circuit wire in a coffee shop has following loads:

Table 1. Load details for question 2 a

Loads	Watts	Number
Fluoresecent lamp	30	4
LED lamp	18	4
Coffee maker machine	1500	1
Microwave	1200	1
Dispenser	800	1
Toaster	800	1
Refrigerator	800	1

The coffee shop is required to be connected to a single phase ac supply of 230 Volts. Determine the size of the wire if the length of the circuit from the distribution pole to the coffee shop's distribution board is 40 meters. [5]

- b. A workshop size 80X60 feet by 12 feet height is to be illuminated to 65 lumens square feet on the working plane. If the coefficient of utilization is 0.55 and the source gives 20 lumens per watt. Find the total wattage required and the number of lamps assuming depreciation factor of 0.8. Consider the wattage of lamp is of 200 Watts. [5]

5.

- a. The Electricity Tariff and the monthly billing methods domestic consumers, from Nepal Electricity Authority (NEA) are provided in Table 2. The appliance and the load wattage are provided in table 3.

Table 2. NEA Tariff rates for question 3a

A YEAR IN REVIEW | FISCAL YEAR 2021/22

ELECTRICITY TARIFF

TARIFF RATES

1. Domestic Consumers

1.1 Single Phase Low Voltage (203 Voltage)

kWh (Monthly)	5 Ampere		15 Ampere		30 Ampere		60 Ampere	
	Monthly Minimum Charge (Nrs.)	Energy Charge (Nrs./kWh)	Monthly Minimum Charge (Nrs.)	Energy Charge (Nrs./kWh)	Monthly Minimum Charge (Nrs.)	Energy Charge (Nrs./kWh)	Monthly Minimum Charge (Nrs.)	Energy Charge (Nrs./kWh)
0-20	30.00	0.00	50.00	4.00	75.00	5.00	125.00	6.00
21-30	50.00	6.50	75.00	6.50	100.00	6.50	125.00	6.50
31-50	50.00	8.00	75.00	8.00	100.00	8.00	125.00	8.00
51-100	75.00	9.50	100.00	9.50	125.00	9.50	150.00	9.50
101-250	100.00	9.50	125.00	9.50	150.00	9.50	200.00	9.50
Above 251	150.00	11.00	175.00	11.00	200.00	11.00	250.00	11.00

Note: If 5 Ampere consumer use more than 20 units, they have to pay NRS. 3.00 per unit

Table 3. Appliance rating (wattage) for question 3 a

S.N	Appliance	Power rating (Watts)	Quantity	Hour of use (October)	Hour of use (November)
1	Fluorescent Lamp	30	10	10	200
2	LCD screen	150	2	5	80
3	Refrigerator	1000	1	12	360
4	Rice cooker	1000	1	10	40

Calculate the monthly energy consumption charge in Nepalese rupees per kilowatt hour (Nrs./kWhr) for the monthly energy consumption for the month of October and November, considering 30 Ampere connections. [6]

- b. What is the difference between a live wire and a neutral wire? Illustrate and describe with the electrical wiring diagram from distribution utility to industrial consumer for a three phase four wire supply connection. [4]

