D 41383 (Pages : 4) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, APRIL 2018

Electrical and Electronics Engineering

EE 14 801—ELECTRICAL SYSTEM DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten :

1 How is NEC different from Indian Electricity Rules, 1962.

2 A common toilet in a public office measuring 12 m × 4.5 m × 3.0 m is to be provided with mechanical exhausting. Design the capacity of the exhaust fans to be used.

3 Define the following terms (i) Utilization factor ; (ii) Reflection factor ; (iii) Coefficient of utilization.

4 How to protect your design against overload and short-circuit ?

5 How do you do air conditioning calculations on the capacity of air conditioner for your room?

6 Write down the steps involved in designing a lighting system for a room.

7 What is earth and neutral wire ? Explain the difference between them.

8 What are the factors considered for the selection of cable ?

9 With neat sketch, explain how megger is used to measure earth resistance ?

10 List out the differences between a SF6 and ACB ?

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Explain the different types of safety aspect to be incorporated in system design.

Or

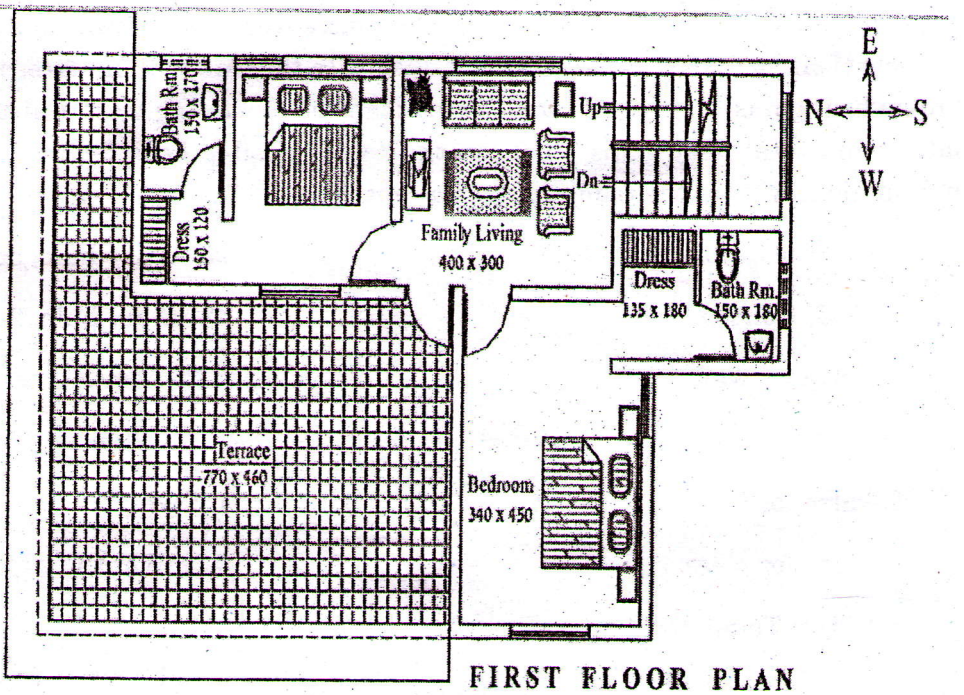
12 A classroom measuring 6.5 m × 8 m is to be provided with an illumination level of 300 lux. The height of the ceiling is 4.5 m. The height of the working plane is 1.0 m above the floor level. The ceiling/wall/floor reflectance are 70/50/20.

Design a lighting scheme for the classroom using general purpose 2 × 40 W fluorescent fixtures whose coefficient of utilisation chart is given below. Assume that the luminaries are suspended from the ceiling at 1.0 m below the ceiling level. The light loss factor may be taken as 0.70. Spacing of lamps shall not exceed the mounting height. Initial lamp lumen = 4000.

Turn over

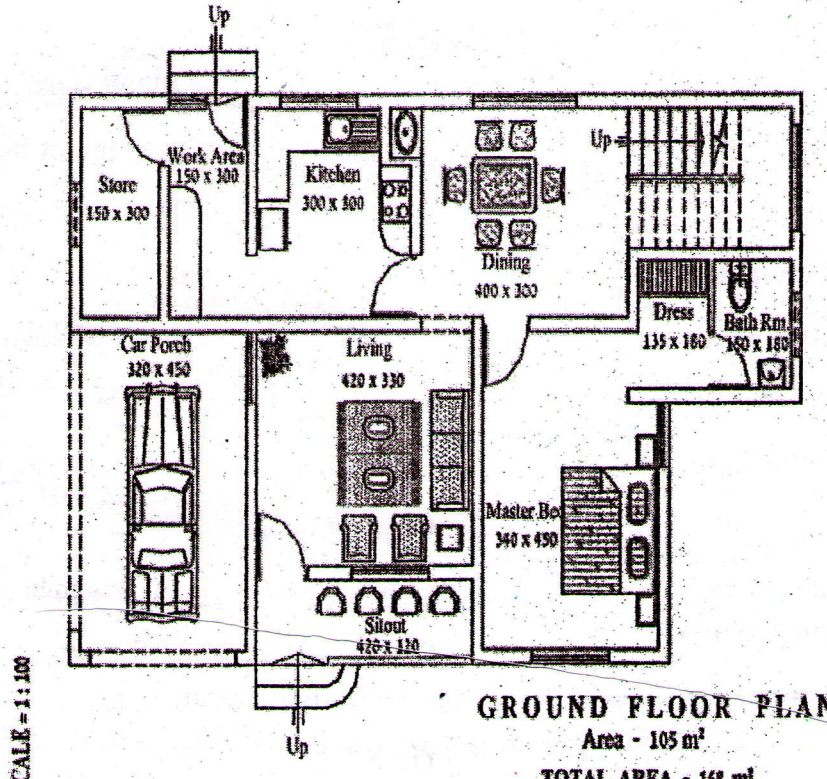
Coefficient of Utilisation (20% effective floor cavity reflectance)						
Effective Ceiling cavity reflectance	80%			50%		
Wall reflectance	50	30	10	50	30	10
RCR						
10	0.33	0.26	0.22	0.31	0.26	0.22
9	0.43	0.35	0.27	0.4	0.35	0.29
8	0.58	0.42	0.35	0.48	0.42	0.36
7	0.58	0.5	0.42	0.55	0.48	0.42
6	0.64	0.57	0.49	0.61	0.54	0.47
5	0.72	0.65	0.59	0.65	0.6	0.56
4	0.77	0.71	0.64	0.71	0.65	0.6
3	0.82	0.76	0.7	0.74	0.69	0.63
2	0.87	0.82	0.77	0.78	0.74	0.7
1	0.91	0.87	0.83	0.81	0.78	0.75

13. The floor plan of a two storied residential building is shown (on Page 3). Calculate the number of light, fan and socket and exhaust fan points required for the building as per NEC norms. Also find out the type of supply required and the size of distribution board.



FIRST FLOOR PLAN

Area - 63 m²



SCALE = 1 : 100

GROUND FLOOR PLAN

Area - 105 m²

TOTAL AREA - 168 m²

Or

14 An air conditioned room that stands on a well ventilated basement measures 3 m wide, 3 m high and 6 m deep. One of the two 3 m walls faces west and contains a double glazed glass window of size 1.5 m by 1.5 m, mounted flush with the wall with no external shading. There are no heat gains through the walls other than the one facing west. Calculate the sensible, latent and total heat gains on the room, room sensible heat factor from the following information. What is the required cooling capacity ?

Inside Conditions	:	25 °C dry bulb, 50 % RH
Outside Conditions	:	43 °C dry bulb, 24 °C wet bulb
U-valve for wall	:	1.78 W/m^2K
U-valve for roof	:	1.316 W/m^2K
U-valve for floor	:	1.2 W/m^2K
U-valve for glass	:	3.12 W/m^2K
Effective Temp. Difference (ETD) for wall	:	25 °C
Effective Temp. Difference (ETD) for roof	:	30 °C
Solar Heat Gain (SHG) of glass	:	300 W/m^2
Internal Shading Coefficient (SC) of glass	:	0.86
Occupancy	:	4 (90 W sensible heat/person) (40 W latent heat/person)
Lighting load	:	33 W/m^2 of floor area
Applicance load	:	600 W (Sensible) + 300 W (latent)
Infiltration	:	0.5 Air Changes per hour
Barometric Pressure	:	101 kPa

15. What are the design considerations of Electrical installation in Commercial building ?

Or

16. What is meant by Power Factor Correction and why should it has to be improved and how it is implemented in APFC ?

17. Explain the designs steps in designing a substation layout.

Or

18. Explain in detail, the various components in a lightning arrester along with its significance.

[4 × 15 = 60 marks]