Name: **Sajid Ahmad**

REG.No: 12671

QuestionNo1 *(CLO-1)* *20*

A. A 100kVA distribution transformer costs Rs 2,00,000 and has an estimated useful life of 20 years. Find the annual depreciation amount, assuming that the scrap value of the transformer to be Rs10,000.

B. The average demand of a consumer is 40 A at 230 volts at unity power factor His total energy consumption annually is 10,000 KWh. If the unit rate is Rs 2 per kWh for the first 500hours use of the demand per annum plus Re 1 for each additional units, Calculate the annual bill of the consumer and equivalent flatrate.

QuestionNo2 ***(CLO-2)*** 10

A. A power station has to supply load as follows:

Timings	KW
11 pm to 5 am	500
5 am to 6 am	750
6 am to 7 am	1000
7 am to 9 am	2000
9 am to 12 noon	2500
12 Noon to 1 pm	1500
1 pm to 5 pm	2500
5 pm to 7 pm	2000
7 pm to 9 pm	2500
9 pm to 11 pm	1000

For the given data above draw the load curve. Select the number and size of generator units to supply this load. Find the reserve capacity of the plant required. Calculate the plant capacity factor. Determine the operating schedule of the units in the station. Calculate the plant factor?

Name: Sajid Ahmad
ID: 12671
Course: Power Generation

Module: 10th Semester
Program: BE(E)
Instructor: Engr: Sanaullah

Q 1:-
(a)

Given data:

Cost of Transformer = P = 200000
Scrape value = S = 10,000
life of Transformer = n = 20 years.

Required:

depreciation amount = D = ?

Formula:

As we know that

$$D = \frac{P-S}{n} \quad \text{——} \ (1)$$

Sol:-

Put the given value in eq (1)
we get

$$(1) \Rightarrow D = \frac{P-S}{n}$$

$$\Rightarrow D = \frac{200000 - 10,000}{20}$$

$$D = 9500 \text{ Rs}$$

Hence Annual depreciation amount is Rs = 9500

Name: Syed Ahmad   Module: 10th semester
ID: 12671   Programme: B.E (E)
Course: Power Generation   Instructor: Engr. Samiullah

Q 1:- (B)

Given data:

Energy = E = 10,000 kwh

Current = I = 40A

Voltage = V = 230V

P.F = Cos θ = 1 = unity

The demand power of the consumer is:

P = VI Cosθ = 230 x 40 x 1

P = 9200 w

OR

P = 9.2 kw

Electricity Consumption for the first 500 hours is:

500 x 9.2

= 4600 kwh

The cost of electricity is Rs 2 per kwH for the first 500 hours. Therefore the consumer has to pay.

4600 x 2 = 9200 Rs/

The Remaining Unit is

10000 - 4600 = 5400 kwh

Name : Sajid Ahmad
ID : 12671

For this 5400 kwh Consumer has to pay

[5400 x 1 = 5400 Rs]

Now the Annual Bill is:

[9200 + 5400 = 14600 Rs]

Now the flat rate equivalent is:

$$\frac{\text{Annual Bill}}{\text{Energy}}$$

$$= \frac{14600}{10000}$$

[= 1.46 Rs/kwh] Ans.

Q No 2

(A)

Sol:→

The maximum demand is 2500 kw If water resources are not available in the visinity the plant would normaly be diesel-electric. For a privately owned plant it could be a steam station if local condition were suitable. the method and considerations

Name : Syied Ahmad.
ID : 12171

for the selection. A size of generating units are however common to all type of stations.

Energy generated during 24 hours.

= (500 x 5) + (750 x 1) + (1000 x 1) + (2000 x 2) + (2500 x 3)
+ (1500 x 1) + (2500 x 4) + (2000 x 2) + (7500 x 2) +
(1000 x 2)

= 38750 kwh

From the nature of load curve it will distributed during day and night. from the load curve it will also be seen that three generators sets will suffice with the following ratings.

Two sets each of 1000kw spacity.
one sets of 500 kw capacity

The reserve capacity required will correspond to the largest size of the unit in the station. In this case a set of 1000 kw will have to be baught and kept as reserve the total installed capacity of the station will therefore be

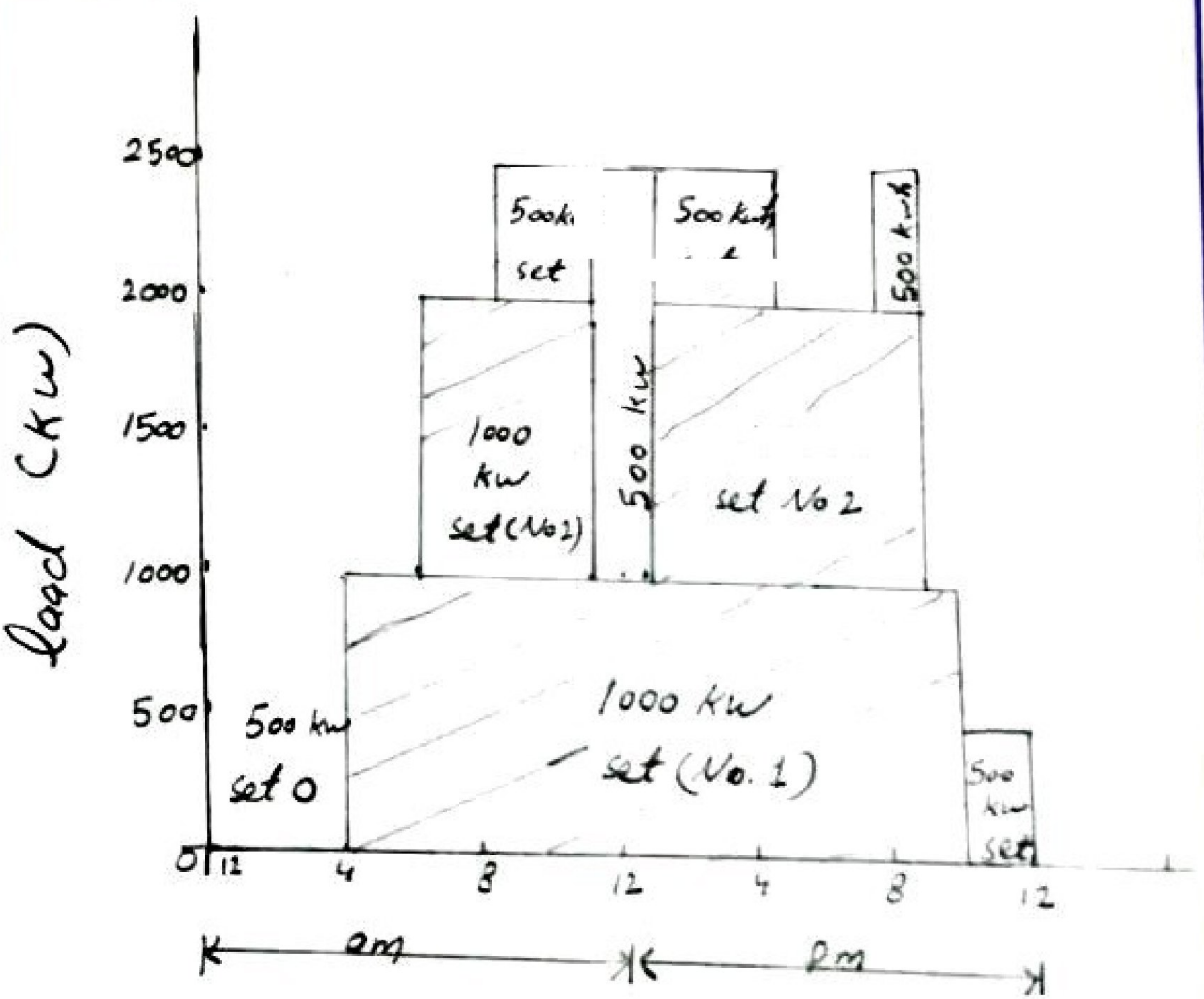
1000 + 10000 + 500 + 1000 (reserve) i.e 35000 kw

Name : Sajid Ahmad
ID : 12671

Plant capacity factor = Energy produced during 24 hrs (kwh) / Installed capacity (kw) x 24 hours.

$$= \frac{38750}{3500 \times 2} = 0.46 \text{ (or) } 46\%$$

Graph:->



load curve of power station

(5)

Sajid Ahmad
12671

The capacity of the individual sets is chosen as far as possible to fit appooximatley the load curve next it should be decided how when & in what Sequence the sets should be started & run. this arranged is known as the operating This schedule care is taken to see that the plant of the required capacity is kept ready might be larger than necessary but should not be indequate.

The type of load curve shown in figure and the size of units selected as above, the operating ~~the~~ schedule can be arransed as fellows.

From 11pm to 5am only the 500 kw set is run.

At 5am the load is expected to increase the ~~first~~ first 1000 kw set is therefore started and parallel with The 500 kw set is stopped.

Thus 1 set of 1000 kw is run
5am to 7am taking up the necessary
before
Increase in load is expected the
Second 1000 kw set is started with
first one.
7am to 9am both the 1000 Kw

the 500 kw set is started and paralled
~~load~~ on

sets

B/w 12 pm and 1 pm the load
decrease owing to recess lunch time
Industry plants
set u >t•:›i•d »i"«r in J••o u<
dropped to 1500 kw.
At
working
7 being over the load on the 500 kw

Name: Sajid Ahmad Module: 10th Semester

Course: Power Generation Instructor: Engr. Samaullah

From 5pm to 7pm both the 1000 kw sets running. At 7pm the load increases to light and all the three sets are run untill 9 pm. After 11 pm only the 500 kw set need be run load Transfer.

The operating schedule fixed as above the energy that could have been generated by the capacity of plant actually runs for schedule time.

(500x6) + (1000x2) + (2000x2) + (2500x3) +

M9+67SzQ+Cio•p +CiSm¿i

= 39,000 Kwh

Energy actually Produced = 38.750 Kwh

$$\text{plant use factor} = \frac{\text{Energy Produced (Kwh)}}{\text{capacity of plant (kw)} \times \text{no of hours}}$$

plants has been operation.

$$= \frac{38750}{} = 0.994$$

or 99.4 %