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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B. Tech-FSE Semester – V

Subject (Course): Fire Engineering-II (IT IS SAFETY IN ELECTRICAL DESIGN)

Max. Marks : 100

Course Code : FSEG 323 Duration : 3 Hrs

No. of page/s: 2

Section-A: Answer the following:

20* 1 = 20 marks

[8]

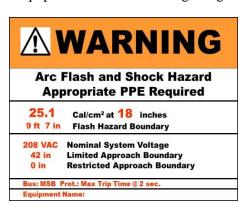
- 1. **Define the following:**
 - a. Balanced Fault
 - b. Hazardous Area
 - c. 'RAB'
 - d. MIE
- 2. Draw the OLD of laptop powered by 230V, 50Hz supply from a 5A electrical outlet via charger of 100W, 10VDC. [4]
- 3. Give reactance diagram of two T/Fs -11KV/415V supplied from 2no's of 110KVA & 250KVA, 11 KV Diesel Generators [4]
- 4. Give the area hazardous classification as per NFPA.

[4]

Section-B: Answer the following:

5 * 8 = 40 Marks

1. An electrical equipment has the following things on its name plate: "Ex ib IIC T1 Z-0".



Name and brief the details of terms mentioned above.

[4+4]

- 2. High voltage equipment poses high risk to employees. An EHV equipment is labeled as: Explain specifications listed in the label shown above.
- 3. Calculate the 3 Phase fault level for the following case. [8]

 A generator connected to a transformer, which is connected to transmission line serving an induction motor. Fault occurred at input terminals of motor. Consider generator values as reference.

The positive sequence reactance's are as given below.

Generator: 0.1 p.u , EMF- 1.0 P.U on 11KV, 1 MVA base

Transformer: 0.09 p.u on 11KV/415V, 2 MVA

Tr. Line: 20ohms, 415V

Induction Motor 415V, 5 HP, Reactance- 0.4 P.U

- 4. Postulate steps in arc flash hazard analysis, also give categories of PPEs to be used around an equipment. [4+4]
- 5. Discuss the construction and function of "Buchholz's relay".

2 *20 = 40 Marks

[8]

- **Section-C:** Answer any two of the following:
 - 1. Discuss the specifications of the following equipment:
 - a. Ex'd'- protection
 - b. Ex 'e'- protection
 - c. Ex 'o'- protection
 - d. Ex 'm'- protection
 - 2. Detail the safe design requirements of power transformers and electromagnetic relays.
 - 3. Explain the procedure of arc flash calculations as per NFPA & IEEE-1584. Also, give their comparison.





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20*1 = 20 marks

[8]

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Section-A: Answer the following:

1. **Define the following:**

a. Electrical Fault

- b. Non-Hazardous Area
- c. 'PAB'
- d. MIC
- 2. Draw the OLD of tablet powered by 230V, 50Hz supply from a 5A electrical outlet via charger of 100W, 10VDC.
- 3. Give reactance diagram of two T/Fs -11KV/415V supplied from 2no's of 110KVA & 250KVA, 11 KV Diesel Generators [4]
- 4. Give the area hazardous classification as per NFPA.

Section-B: Answer the following:

5 * 8 = 40 Marks

[4]

- 1. An electrical equipment has the following things on its name plate: "Ex i_b IIC T1 Z-0". Name and brief the details of terms mentioned above. [4+4]
- 2. Discuss specifications listed in below label:



3. Calculate the Phase fault level for the

a.

following [8] case. A generator connected to a transformer, which is connected to transmission line serving a synchronous motor. Fault occurred at input terminals of synchronous motor. Consider generator values as reference.

- 1. The positive sequence reactance's are as given below.
- 2. **Generator**: 0.1 p.u , EMF- 1.0 P.U on 11KV, 1 MVA base
- 3. **Transformer**: 0.09 p.u on 11KV/415V, 2 MVA
- **Tr. Line**: 20ohms, 415V
- 5. **Motor 415V, 5 HP,** Reactance- 0.4 P.U @ 0.9 lagging p.f

4. Explain arc flash hazard analysis procedure as per NFPA & IEEE. [4+4]
5. Discuss the construction and function of "Buchholz's relay". [8]

Section-C: Answer any two of the following:

2*20 = 40 Marks

- 1. Discuss the specifications of the following equipment:
 - a. Ex'd'- protection
 - b.Ex 'i'- protection
 - c. Ex 'p'- protection
 - d.Ex 'm'- protection
- 2. Detail the safe design requirements of power transformers and electromagnetic relays.
- 3. Explain the procedure of arc flash calculations as per IEEE-1584. Also, give its comparison with NFPA.



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