

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Program: B. Tech- FSE
Subject (Course): Safety in Electrical Design
Course Code : FSEG 323
No. of page/s: 2

Semester – V
Max. Marks : 100
Duration : 3 Hrs

SECTION A

	Answer the following:	20 Marks	
Q 1	Define “Electrical Fault”. Brief the causes of such faults.	[4]	CO 2
Q 2	Brief the significance of safety in design, selection, installation, operation and/or maintenance of electrical equipment with an example.	[4]	CO 1
Q 3	Define the following: a. Encapsulation protection b. MESH c. Spontaneous Ignition d. Pick-up Value of Relay	[4]	CO 6
Q 4	Postulate the area hazardous classification as per NFPA.	[4]	CO 5 & CO 6
Q 5	List the steps involved in symmetrical fault analysis.	[4]	CO 2

SECTION B

	Answer the following:	40 Marks	
Q 5	Name the details to be imprinted as a part of arc flash label and quote the standard for the same.	[10]	CO 3
Q 6	Discuss about various characteristics of fuses that affect the operation of fuse.	[2+1+7]	CO 3
Q 7	Calculate the 3 Phase fault level for the following case: 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: $X_g = 0.1$ p.u , EMF- 1.0 P.U on 10KV, 1 MVA base Transformer: $X_T = 0.09$ p.u on 11KV/415V, 2 MVA Tr. Line: 10ohms, 415V Induction Motor 415V, 5 HP, Reactance- 0.4 P.U	[10]	CO 2
Q8	Discuss the classification of protective relays along with their applications and limitations (OR) Differentiate between ‘Power and Distribution Transformers’ based on their operational and design criteria.	[2 +8] [10]	CO 4

SECTION-C

	<u>Answer all the following:</u>	40 Marks	
Q 9	Discuss the specifications of the following equipment: a. Ex 'd'- protection b. Ex 'i'- protection c. Ex 'o'- protection d. Ex 'n'- protection	[4*5]	CO 5 & CO 6
Q 10	Expand and define the word "CB". Discuss the classification of CBs used in substations. Enlist the various types of CBs used in LV and MV appliances along with their functions, uses and limitations with necessary sketches. Also, discuss the safety aspects of selection/design for the same. (OR) Discuss the procedures of AFHA as per both NFPA and IEEE	[3+4+10 +3] [10+10]	CO 3 & CO2

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SECTION A

	Answer the following:	20 Marks	CO
Q 1	Define “Symmetrical Fault”. Enlist the steps involved in symmetrical fault calculation.	[2+3]	CO2
Q 2	Brief the significance of safety in design, selection, installation, operation and/or maintenance of electrical equipment with an example.	[5]	CO 1
Q 3	Define the following: a. Group-II equipment b. Powder filled equipment c. Fusing factor d. IDMT relay	[4]	CO 6
Q 4	Differentiate between the two most common HAC methodologies used internationally.	[4]	CO 5 & CO 6
Q 5	Brief the common procedure for AFHA.	[4]	CO 2

SECTION B

	Answer the following:	40 Marks	
Q 5	Differentiate between ‘Power and Distribution Transformers’ based on their operational and design criteria.	[10]	CO 3
Q 6	Define ‘Fuse’ (electrical). Give the classification fuses and discuss about various types of (electrical) fuses used in appliances having voltage up to 1kV with necessary sketches.	[2+1+7]	CO 4
Q 7	Calculate the 3 Phase fault level for the following case: 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: $X_g = 0.1$ p.u , EMF- 1.0 P.U on 11KV, 1 MVA base Transformer: $X_T = 0.09$ p.u on 11KV/415V, 2 MVA Tr. Line: 15 ohms, 415V Synchronous Motor 400V, 5 HP, Reactance- 0.4 P.U	[10]	CO 2
Q8	Define “Protective Relay”. Discuss various types of relays used in power system along with a short note on operation principles of electromagnetic relays. (OR) Differentiate between ‘Power and Distribution Transformers’ based on their operational and design criteria.	[2 +2+6]	CO 3

SECTION-C

	<u>Answer all the following:</u>	40 Marks	CO
Q 9	Discuss the specifications of the following equipment: e. Ex 'e' - protection f. Ex 'i' - protection g. Ex 'p' - protection h. Ex 'm' - protection	[4*5]	CO 5 & CO6
Q 10	Expand and define the word "CB". Discuss the classification of CBs used in substations. Enlist the various types of CBs used in LV and MV appliances along with their functions, uses and limitations with necessary sketches. Also, discuss the safety aspects of selection/design for the same. (OR)	[3+4+10 +3] [10+10]	CO 3