UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program:	**M.Tech (PLE)**	**Semester – III**	
Subject (Course):	**Defect Assessment & maintenance In Pipelines-II**	**Max. Marks**	**: 100**
Course Code :	**MPEG-811**	**Duration**	**: 3 Hrs**
No. of page/s:			

Section A

Question No: 1 to 5 are compulsory and to be answered. Question No: 1 to 3 is objective types with multiple choice Questions, fill in the blanks and correct the statement. Question No: 4 & 5 are short answered questions. All questions are compulsory and carry equal marks.

Maximum Marks: 20

Q: 1: **Multiple choice questions have 3 to 4 choices. Mark the most appropriate answer as a correct answer. All questions carry one mark each.**

1. Austenitic stainless steel have a composition of :
   a) 18-8 Stainless steel
   b) 25-15 Stainless steel
   c) Both of above.
2. Coating thickness achieved in PU coating is :
   a) Maximum up to 1100 Microns.
   b) Between 1500 to 2000 Microns
   c) Between 2 mm to 3 mm
3. To have effective tape coat application on sand blasted pipe, it is desired that :
   a) Ground clearance of 30cm & side clearance of 50cm is sufficient
   b) Minimum ground clearance of 50cm & side clearance of 80cm to be maintained.
   c) Ground clearance can be kept as per availability at site considering soil condition
   None of above
4. In CP rectifier under auto Reference mode, PSP voltage is controlled :
   a) In automatic mode
   b) With help of reference electrode feedback
   c) PSP of pipeline at feeding point within $\pm$15mV of set value
   d) All of above
   e) None of above

Q: 2: Fill in blanks. Write most appropriate answer. All questions carry one mark each.

1) Thermal stabilization during hydrostatic testing for 24 hrs. shall be done and section is said to be thermally stabilized if difference not higher than _____ degree is attained between the average value of soil temperature readings and the hydrostatic testing of a particular section is considered acceptable if difference is less or equal to _____bar.

2) Coating Break-down Factor Is the _____ between the current density required to polarize coated surface and density required to polarize bare surface.

3) Corrosion rate can be_____ if exposed pipe surface is made to collect current from the soil

4) ERF is calculated to classify the defects on the basis of severity. ERF is the ratio of - _____ of the pipeline to the _____ in corroded area of the defect.

Q: 3: **Mark statements as right or wrong. All questions carry one mark each.**

1) Austenitic stainless steel ie 18-8 stainless steel(300 series) is selected for use in environment which is not prone to chloride stress corrosion cracking

2) Coating can be carried any time after application of primer and drying time of the primer does not have any effect on adhesion of coating material

3) In CP rectifier under manual Mode CP output voltage is controlled from 0 to rated value, in abrupt steps through switches, using Autotransformer with tapping's

4) Secondary sensors measure the flux leakage in the internal or external pipe surface. Primary sensors will measure the flux leakage caused by metal loss in the internal surface

Q:4: Write eight numbers of instruments required for checking coating condition during inspection at site.

Q:5: What are the advantages of back fill material in anode beds & steps required in maintenance of anode beds.

Section B

This section contains Four (4) Questions, (ie Q No: 6 to Q No: 9). Q. No: 9 has internal choice & one part is to be answered. Each question carry 10 marks each. All questions are compulsory.

Maximum Marks: 40

Q:6: Describe the various factors effecting the selection of material for use of industrial piping or for any equipment construction. Illustrate various heat treatments for changing grain structure of alloy.

Q:7: Pressure testing of pipe size 10", wall thickness 0.27900". X-52, Length: 5 miles is to be carried out. Test pressure is 2,430 psig, and Temperature is 50F. Determine the incremental volume required by the pipe to reach from NTP to the test pressure and temperature. After a period of time, the test pressure, P has decreased to 2,422 psig and the temperature of the pipe and test water has decreased to 48F. Ascertain the quantity of water required to be added or drained out to reach the test pressure.

Q:8: How do you carry out the design of CP system of a pipeline & ascertain the location of anode beds.

Q:9: Explain Microbiologically Influenced corrosion, classification of microorganisms, BIO FOULING observed in pipelines & Prevention of MIC,

OR

Write short notes on any two of the following:

a) Evaluation methods for determining length & depth of a defect as per ASME B 31G-2009.

b) Various design codes applicable for ascertaining defect location reduced allowable operating pressure.

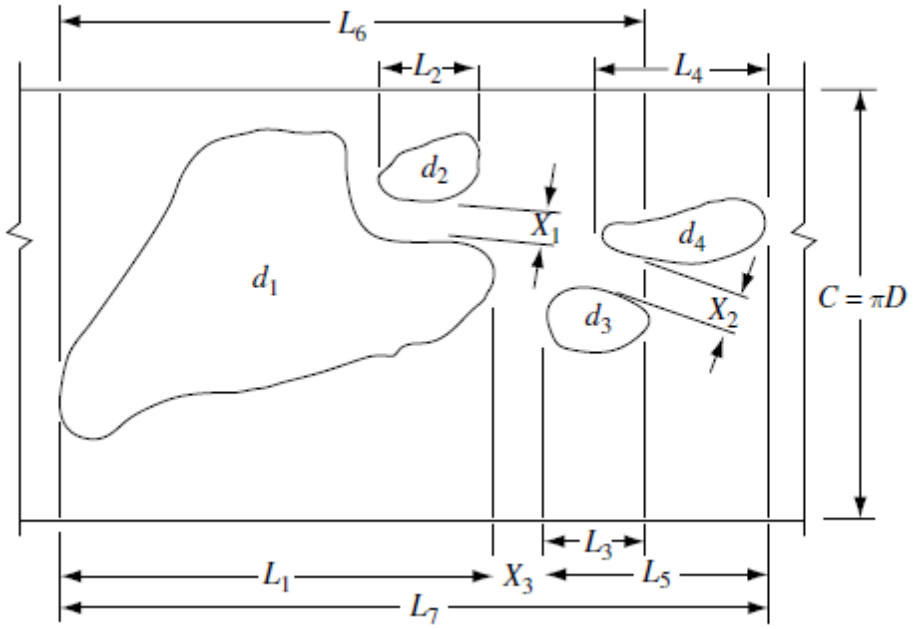
c) Describe various stray currents considerations observed in underground pipeline & rectification measures taken for each type of corrosion.

Section C

This section contains two questions (Q No: 10 & 11). Both questions are compulsory and to be answered. Q NO: 11 have internal choice & one part is to be answered. Each question carries 20 marks each.

Maximum marks: 40

Q:10: Several metal loss profiles of a corroded pipe is shown in the following sketch to examine the corroded pit interaction whether separate or interacting .



Complete the following table and show interaction among all the corrosion pits

Overall flaw length	Separate or Interacting	Conditions *	Maximum Depth	Conditions
	*X =Distance of full wall thickness between metal loss areas (corroded regions).			

Q:11:

Draw pictorial diagram for ICCP system. How do you regulate the PSP in pipeline through CP unit? Calculate CP ground bed resistance for vertical anode beds in parallel with following data's :

i.	Soil or (back fill) resistivity in ohms-cms	1000 ohms-cm
ii.	Number of anodes in parallel	4 Nos each
iii.	Length of back(anodes) fill in meters	2 meters
iv.	Diameter of back fill (anodes) in meters	0.3 meters
v.	Anode spacing in meters	3 meters

OR

Explain various types of “INLINE INSPECTION TOOLS” used in ILI inspection of pipelines with advantage of individual technology.