

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2019

Course: A Primer on Stainless Steels

Program: B. Tech Mechanical, Mech+spl in MD,TH,PROD,MSNT

Course Code: MHEG 461

Semester: VII

Time 03 hrs.

Max. Marks: 100

Instructions:

SECTION-A: 20 marks

S. No.		Marks	CO
Q 1	List four major types of Stainless Steels and discuss how are they designated numerically.	4	CO1
Q 2	List the major residuals in steel and mention their bad effects.	4	CO1
Q 3	Elaborate the difference between 304 and 304L grades of Stainless Steel. Identify the grade you would prefer to use.	4	CO1
Q 4	Mention 2 major advantages of using 200 series of Stainless Steel.	4	CO3
Q 5	Discuss why a minimum of 10.5 % Cr is necessary in Stainless Steels.	4	CO1

SECTION-B: 40 marks

Q 6	Clearly explain the meaning of term 'Quality of Steel.' Mention the major attributes of steel quality.	10	CO2
Q 7	Is it possible to get the final chemistry of stainless steel in Electric Arc Furnace? Explain how the different residuals are controlled during steelmaking process.	10	CO2
Q 8	Explain what is meant by the following finishes of Stainless Steel. 2B , 2D , 2R , 2J Among these finishes, identify the one that exhibits the highest corrosion resistance, and also elaborate the reason for it's highest corrosion resistance.	10	CO2
Q 9	Clearly state the necessity for cold rolling, annealing and pickling of stainless steel.	10	CO2

SECTION-C: 40 marks

Q 10	<p>Clearly explain the role of Nickel equivalent and Chromium equivalent in stainless steel. Mention the importance of the ratio of these two equivalents.</p> <p>Discuss the importance of this ratio in controlling the ferrite and austenite phase.</p> <p>Evaluate this ratio for the following grades: 409, 430, 304, 316, 310.</p>	20	CO3
Q 11	<p>List the major types of corrosion observed in Stainless Steel.</p> <p>Define PREN, and discuss how PREN is calculated.</p> <p>Discuss the significance of PREN value for a grade of Stainless Steel.</p> <p>List the major factors influencing pitting and crevice corrosion, and elaborate their effects.</p> <p style="text-align: center;">OR</p>	20	CO2
Q 12	<p>List the major advantages of Duplex Stainless Steel.</p> <p>Mention the roles of different alloying elements and phases in Duplex stainless steels.</p> <p>Specifically mention the types of Lean, Normal and Super Duplex; and discuss their applications.</p>		