Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Statistical Methods in Petroleum Engg **Semester: VI**
Program: B.Tech APE-UP **Time : 03 hrs.**
Course Code: MATH 3029 **Max. Marks: 100**

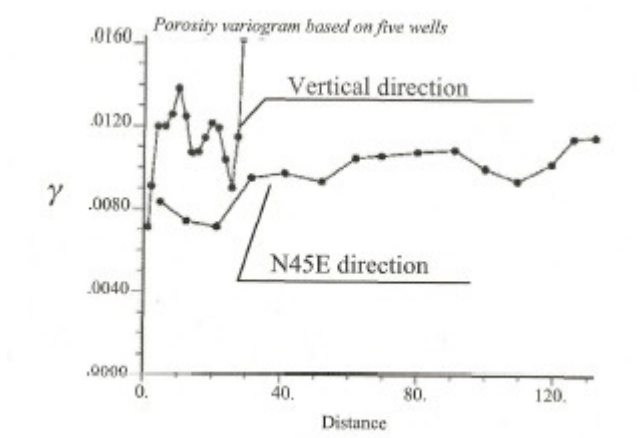
Instructions: All questions are compulsory. However, there is internal choice in some question

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Find out the correlation coefficient of two variables having variances 4, 9 and covariance of 5	**4**	**CO1**
Q 2	Explain the use of ANOVA test	**4**	**CO1**
Q 3	Define the term 'Cokriging'	**4**	**CO1**
Q 4	Explore the different types of kriging methods being used in hydrocarbon exploration	**4**	**CO2**
Q 5	Explain the term 'global polynomial' and 'local polynomial' method of data manipulation	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Core sample were collected from a sandstone bearing reservoir at 200 locations found to have Mean and standard deviation porosity of 16% and 5% respectively. How many samples are likely to have porosity more than 21% ? Cumulative normal distribution table is given as follows:				**10**	**CO2**
	Z	P	Z	p		
	0.20	0.57	1.2	0.88		
	0.25	0.59	1.3	0.90		
	0.35	0.63	1.4	0.91		
	0.45	0.67	1.5	0.93		
	0.90	0.81	1.6	0.94		
	1.0	0.84	1.8	0.95		
Q 7	Demonstrate that Variogram model can help in understanding homogeneity/heterogeneity of reservoir properties. Comment on the porosity measurement variogram plotted along different direction as per given figure.				**10**	**CO3**

<table>
<tr><td></td><td> 
</td><td></td><td></td></tr>
<tr><td>Q 8</td><td>Grid-wise Simulation study of 2 varaibles conducted are given in the table including their highest and lowest values. An output model which is a sum of two variable has been generated. Create a output grid with their maximum and minimum possible values
<table>
<tr><td>Variable 1</td><td>Variable 2</td><td>Variable 1</td><td>Variable 2</td></tr>
<tr><td>9</td><td>12</td><td>10</td><td>14</td></tr>
<tr><td>13</td><td>10</td><td>12</td><td>8</td></tr>
<tr><td>12</td><td>18</td><td>11</td><td>16</td></tr>
<tr><td>14</td><td>19</td><td>14</td><td>17</td></tr>
</table></td><td>10</td><td>CO4</td></tr>
<tr><td>Q 9</td><td>Explain the t-test of correlation with example
OR
Develop a linear regression model for oil well production data while taking a case study from volve oil field</td><td>10</td><td>CO5</td></tr>
<tr><td colspan="4">SECTION-C
(2Qx20M=40 Marks)</td></tr>
<tr><td>Q 10</td><td>Derive a principal components from a multivariable datasets. Explain with example that Principal component analysis (PCA) is known for data reduction technique.</td><td>20</td><td>CO4</td></tr>
<tr><td>Q 11</td><td>Demonstrate the Monte-Carlo method of conditional simulation study in multi-variable datasets for reservoir simulation considering variables are spatially dependent
OR
Construct a high resolution Geocellular model using Geostatistical methods</td><td>20</td><td>CO5</td></tr>
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