Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course Name: Methods of Surface Mining **Semester: IV**
Programme : B.Tech Mining Engg **Time: 03 hrs**
Course Code : PEMI 2003 **Max. Marks : 100**
Instruction: Draw suitable sketches wherever necessary
Section A: All questions are compulsory
Section B: First 3 questions are compulsory, attempt any 1 from Q 8
Section C: First question is compulsory, attempt any 1 from Q 10

SECTION A

S. No.		Marks	CO
Q 1	Discuss the relationship between haul road width & machinery ply on the same	05	CO1
Q 2	Discuss the fundamental difference between shovel & backhoe	05	CO1
Q 3	Explain the two components of stopping distance	05	CO2
Q 4	"Sight distance should always greater than stopping distance", defend with suitable answer.	05	CO2

SECTION B

Q 5	In a coal mine there are signs of auto-heating. NG based explosive is supposed to be used for blasting. Looking at the smoke coming out from the holes, it is assumed that temperature of shot hole was around 110^{o} (appox). Being a mining engineer, suggest some remedial measures to handle this situation	10	CO3
Q 6	a. Summarize the factors for selecting an efficient transporting system. Support your answer with due justifications b. Categorize the design considerations of haul road into suitable classes.	05*2= 10	CO2
Q 7	Calculate the frequency rate of accident of a mine employing 500 persons and there was 2 fatal,3 reportable and 5 minor injury was reported in a year.	10	CO3

<table>
<tr><td>Q 8</td><td>A surface coal mine currently in operation plans to undertake additional blasting loading ANFO with a density of 0.8 g/cm^3. Additional relevant parameters with respect to this proposed shot are:
• Burden = 28 feet,
• Spacing = 33 feet,
• Bench height (or hole depth) = 135 feet,
• Hole diameter = 11 inches,
• Stemming = 30 feet, and
• No. of holes = 200.
In pounds of explosives per bank cubic yard of rock, what will the powder factor for one of these boreholes?

OR

A new quarry is being opened in a limestone formation having horizontal bedding with numerous weak joints. From borehole drilling, it is believed that limestone is highly laminated with weakly laminated layers. Due to wet condition, a cartridge slurry (relative bilk density =140) will be used as explosive. The 6.5-inch blast hole will be loaded with 5-inch diameter cartridge. Calculate the burden Distance</td><td>10</td><td>CO4</td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q 9</td><td>There is one Lignite deposit with thin overburden. Nature of strata is soft & it’s mostly common earth. The company must decide between two excavators i.e. Dragline or Backhoe. Detailed specifications for both are given below---

<table><tr><th>For Dragline</th><th>For Backhoe</th></tr><tr><td>Size: 1.53 m^3</td><td>Heaped bucket capacity: 0.57 m^3</td></tr><tr><td>Angle of swing: 120</td><td>Angle of swing: 90</td></tr><tr><td>Job efficiency: 35 minutes</td><td>Job efficiency: 50 minutes</td></tr><tr><td>Soil swell: 25%</td><td>Fill factor: 95%</td></tr><tr><td>Average depth of cut: 2.4 mtrs
Max. Depth of cut: 3.0 mtrs</td><td>Average depth of cut: 4.3 mtrs
Max. depth of cut: 6.1 mtrs</td></tr><tr><td colspan="2">Looking at the above condition, Comparing the daily production & other factors, justify the best suited one</td></tr></table></td><td>20</td><td>CO6</td></tr>
<tr><td>Q 10</td><td>Thriveni earth movers has mining lease for Iron ore. The targeted production is 14 Million tons. The mine will remain operational throughout the year. To achieve this, 85 tons capacity dumpers are required.

With given set of information, calculate the number of dumpers required to achieve the target

Cycle Time: 13 minutes
Job efficiency: 75%
Mechanical availability: 85%</td><td>20</td><td>CO5</td></tr>
</table>

	OR With following specifications, with valid reasons, design a suitable transportation system for a mine. Deposit is flat, but terrain inclination is quite high. Mine is in tropical climatic condition. The mining company needs to send its ROM to processing plant which is 18 kms away from the mining site and expected production per day is 25000 tons		

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Section C: All questions are compulsory

SECTION A

S. No.		Marks	CO
Q 1	a. Differentiate between width of working bench and working bench d. Discuss the significance of break-even stripping ratio in open pit mining	05*2= 10	CO1
Q 2	a. Establish the relationship between bench height and selection of excavator b. Justify the use of sand & gravel in haul road	05*2= 10	CO2
	SECTION B		
Q 3	a. Discuss the signaling practice of dumpers b. In a coal mine, targeted production is 10,000tons per day. To meet this expectation, OMS is calculated to be 3tons/ man/shift. Stripping ratio is 1.2: 1. Calculate the number of persons required to meet this target.	05*2= 10	CO3
Q 4	Evaluate the role of operating parameters in calculating efficiency of shovel	10	CO5
Q 5	OMC is planning to open a new chromite mine, supposed to operate 360 days in a year. The expected production is 100 million tons per annum. Density of ultramafic rock is 2.75 ton/m3. To do blasting in 4 faces, the following specifications are finalized. Depth of each drill: 300 mtrs, Spacing: 5.5 mtrs, Burden: 4 mtrs & bench height: 11 mtrs. Compute • Total number of holes to be drilled • Area of drilling • Number of drills to be done	10	CO4
Q 6	a. What is the meaning of 3/25 in case of dragline? b. Discuss the role of outage factor in equipment performance c. Arrange pass time, swing time & spotting time in proper sequence with suitable justification for the same. d. Differentiate between in-situ & heap leaching e. Explain the blade specifications of ripper	02*5= 10	CO5

<table>
<tr><td></td><td>OR

Compare bucket dredging with Hydraulic dredging and suggest which is more suitable form industry point of view.</td><td>10</td><td></td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q 7</td><td>a. Define Severity index and calculate the same with given set of information----

2 fatal and 8 serious bodily injury case reported. Total man-shift worked of mine is 4,00,000. In your view can the mine be considered as accident prone?

b. A person while unloading the tub got his thumb cut which led to 60% loss of his earning capacity. In this case what will be the equivalent man-days lost?</td><td>10*2= 20</td><td>CO3</td></tr>
<tr><td>Q 8</td><td>
<table>
<tr><th>For Backhoe</th><th>For Clamshell</th></tr>
<tr><td>Size: 0.25 m^3</td><td>Actual bucket capacity: 0.71 m^3</td></tr>
<tr><td>Angle of swing < 60^0</td><td>Estimated cycle time: 40 secs</td></tr>
<tr><td>Job efficiency: 50minutes</td><td>Job efficiency: 50 minutes</td></tr>
<tr><td>Fill factor: 85%</td><td>Fill factor: 95%</td></tr>
<tr><td>Average depth of cut: 50% of maximum reach</td><td>-</td></tr>
<tr><td colspan="2">Considering the given information, comparing the daily production & other factors, suggest the excavator, the company would like to go for.</td></tr>
</table>
</td><td>20</td><td>CO6</td></tr>
</table>