B.E. Mining Engineering Sixth Semester **MN602 - Mine Rescue Engineering**

P. Pages: 2

Time : Three Hours

* 1 3 5 2 *

GUG/W/18/1718

Max. Marks: 80

Notes : 1. Due credit will be given to neatness and adequate dimensions.

- 2. Assume suitable data wherever necessary.
- 3. Illustrate your answers wherever necessary with the help of neat sketches.
- 4. Weightage to the question indicated on its right.

a) A fire in a section of a gassy mine was sealed in the main intake and return airways. The results of the analysis of samples taken from stoppings are given as follows.

Day of	$CO_2\%$	CH4%	$O_2\%$	N_2 %	CO %
sampling	I, R	I, R	I, R	I, R	I, R
1	0.12, 0.35	0.19, 1.8	20.7, 19.7	78.9, 78.1	0, .025
3	0.35, 0.56	4.5, 9.5	19.3, 16.3	75.9, 73.2	0.005, 0.4
6	0.43, 0.50	9.6, 26.4	17.8, 14.6	72.1, 58.5	0.006, 0.06
9	0.39, 0.38	3.5, 55.6	12.5, 8.3	52.1, 34.8	0.006, 0.009

(I* - Intake, R* - Return)

Calculate CO/O₂ deficiency Ratio and CO₂/O₂ deficiency ration for 3^{rd} and 9^{th} day and comment on status of fire.

b) Explain "Balancing of Pressure" on fire stoppings.

OR

2. Explain:

3.

5.

- i)CMRI INDEX6ii)Inert gas infusion technique.6iii)Fire Extinguisher (any one)4a)Explain following terms.
i)8i)Ignition temperature.8
 - ii) Lower limit of flammability.
 - iii) Lag on Ignition
 - iv) Flame length

b)	Discuss the evidences to be collected during investigation after mine explosion.	8

OR

- **4.** Explain
 - i) Characteristics of firedamp explosion.
 ii) Water barrier.
 iii) Qualities of stone dust used for suppression of coal dust explosion.
 4
 Discuss in detail various causes of Inundation in Underground mines.
 10
 State the precautions to be observed while approaching old waterlogged workings.
 6
 - OR

a)

b)

4

6.	a)	Calculate thickness of an arched dam to be constructed in the mine from the following data. Height of Roadway – 2m Width of Roadway – 2.5m Head of water – 200m Safe crushing strength of material – 30kg/cm2 (cement concrete)						
	b)	Explain the various pattern of holes used during drivage of exploratory headings approaching old waterlogged workings.	8					
7.	a)	Explain the following terms with example.i)Respiratory quotient.ii)Filter Apparatusiv)Reviving Apparatus	8					
	b)	Discuss the objective and functions ofi)Rescue stationii)FABiii)RRRT	8					
	OR							
8.	a)	Describe with neat sketch construction and working of self contained chemical oxygen self Rescuer.	8					
	b)	State different methods of reopening sealed off area. What factors are taken into account while selecting particular method? Which parameters decide the time of reopening of sealed off area?						
9.	a)	 Define following terms. i) Luminous flux. ii) Luminous Intensity. iii) Candle power. iv) Mean spherical candle power. v) Illumination. 	10					
	b)	Explain physiological properties of mine dust.						
		OR						
10.	a)	 A 500 W lamp having MSCP of 800 is suspended 3m above the working plane. Calculate i) Illumination directly below the lamp at the working plane. ii) Lamp efficiency. iii) Illumination at a point 2 - 4 m away on the horizontal plane from vertically below the lamp. 						
	b)	Calculate the dust concentration at working face of the coal mine from the dust sample collected by Gravimetric dust sampler. i) Initial wt. of filter paper – 3 mgm ii) Final wt. of filter paper – 12 mgm iii) Rate of sampling $2.5 \times 10^{-3} \text{m}^3 / \text{min}$ iv) Time of sampling – 8 hours	6					
