B.E. Mining Engineering Fifth Semester **MN502 - Mine Climate Engineering**

P. P Tim	ages : e : Thi	2 GUG/W/18/10 ree Hours * 1 3 0 1 * Max. Marks	GUG/W/18/1652 Max. Marks : 80			
	Note	 Due credit will be given to neatness and adequate dimensions. Assume suitable data wherever necessary. Illustrate your answers wherever necessary with the help of neat sketches. Marks are indicated in the right margin. 				
1.	a)	Explain the following terms :i)Fire dampii)Black dampiii)White dampiv)Stink damp	8			
	b)	What is methane layering & methane layering number ? Also state the factors affecting methane rate emission in mines.	8			
		OR				
2.		Explain the following :				
	a)	Physiological effects of O ₂ deficiency in mine air.	4			
	b)	MSA-D6 Methonometer.	6			
	c)	Infrared spectrometry.	6			
3.	a)	Discuss the physiological effects of heat & humidity on miner.				
	b)	The volume of air entering a mine is $1080 \text{ m}^3/\text{min}$ when the surface fan producing a pressure of 500 Pa. When the fan is stopped, the quantity of air entering the mine falls to 540 m ³ /min. Calculate the amount of natural ventilation pressure assisting the fan.				
		OR				
4.	a)	Derive an expression for calculation of NVP from air densities.				
	b)	Air temperature in DC and UC shaft 465 m deep are 30°C and 37°C respectively. What is the height of motive column ? Find out also the density of the DC air and the amount of natural ventilation pressure.	8			
5.	a)	10 m^3 /sec of air passes through a roadway with cross-section 4m x 3m and 400 m long. If another roadway of similar cross-section and similar surface and 800 m long is added in parallel to it, what would be the total quantity now passing through the two splits ?	8			
	b)	Discuss the objectives and importance of ventilation survey in mines.	8			
		OR				
6.	a)	Derive an expression for equivalent resistance when the mine roadways are - i) In series and ii) In parallel	8			

b) In the following ventilation circuits, value of resistance for individual airways have been determined in NS^2m^{-8} .



if the fan exhaust 50 m^3/s , determine the equivalent resistance of the system and the total pressure required.

- 7. a) A fan running at 100 rpm develops 750 Pa of pressure and delivers 6250 m³/min of air. It is driven by a motor of 120 kW. What is the efficiency of the system ? What will be the quantity, pressure and motor power if the speed is reduced to 85 rpm.
 - b) With neat sketch, describe operation of similar fans in series with characteristic curves.
 8 Also state the conditions when series operation of fans is required.

OR

8. a) Calculate the theoretical pressure produced by a centrifugal flow fan, 2.75 m in dia, 2 m wide, running at 400 rpm and delivering 5700 m³/min of air Blades are bent backward at 40° angle. Assume air density to be 1.2 kg/m³.

b)	State the uses with their location of following in brief.				
	i) Fan drift	ii)	Evasee		
	iii) Booster fan	iv)	Auxiliary ventilation		

- 9. a) Explain the procedure of estimation of total air quantity requirement of the mine. 8
 - b) Discuss the factors which affects the economic design of mineairways. 8

OR

10. a) State the objective and various steps involved in ventilation planning.
8
b) List and discuss various heads taken into consideration for estimating total ventilation cost of the given mine.

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