



CBCS SCHEME

15MN51

Fifth Semester B.E. Degree Examination, June/July 2019 Mine Environment and Ventilation Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the occurrences, properties, detection, measurements and physiological effects of carbon monoxids and hydrogen sulphide. (07 marks)
b. Classify the degree of gassiness of coal mining. (03 marks)
c. Calculate the percentage of various damps present in the mine air sample which gave the following analysis results.
 $O_2 = 19.11\%$, $n_2 = 79.04\%$, $CO_2 = 0.25\%$, $CH_4 = 1.58\%$. Calculate also the composition of the black damp. (06 Marks)

OR

- 2 a. Explain any two methods of methane drainage. (08 Marks)
b. Three air streams meet to form a common main return air stream at $1550m^3/min$. The initial air stream contain CH_4 as follows :
i) $300m^3/min$ – No methane ii) $600m^3/min$ – No methane iii) $650m^3/min$ – 1.1%. In addition there is a blower in the main return, airway giving $2.5m^3$ of pure methane per minute. (08 Marks)

Module-2

- 3 a. Explain the sources of heat n mines. (08 marks)
b. Explain the measurement of relative humidity, and pressure of air, with a neat sketch. (08 Marks)

OR

- 4 a. Explain the effect of heat and humidify on mine workers. (10 Marks)
b. What is the current velocity in an airway when the pitot tube reading is 4mm, barometer 760mm and temperatures $17^\circ C$.? (06 Marks)

Module-3

- 5 a. Explain the regulators with a neat sketch. (08 Marks)
b. A fan motor is 20% overloaded when the fan passes $6000m^3/min$ at 75mm w – g. Calculate the area of regulator which should be installed to takes the overload. (08 Marks)

OR

- 6 a. Explain the air-crossing with a neat sketch. (07 Marks)
b. A total quantity of $2000m^3/min$ is passing in three split as follows :
Split A : $3m \times 2.5$: 100m
Split B : $4m \times 2.0$: 80m
Split C : $3.5m \times 3.0m$: 120m
Calculate the quantity in each of the splits. (09 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain the causes of natural ventilation pressure. (04 marks)
 b. Derive an expression for NVP considering air density. (05 marks)
 c. Find out the force required to open the main separation door $1.5\text{m} \times 0.9\text{m}$ in size in a naturally ventilating mine. The DC shaft is 210m deep having an average temperature at 20°C . The up cast shaft is 180m deep having an average temperature of 32°C . Weight at 1m^3 at air at 20°C is 1.20kg. (07 Marks)

OR

- 8 a. Derives an expression for head developed by centrifugal fans. (08 Marks)
 b. A fan driven by a 3 phase AC motor was tacking a current of 19amps at a voltage of 3000, the power factor being 0.8. If the w.g was 112mm and the quantity of air 2830 cubic meters/minute, what would then be the overall efficiency and what would be the efficiency of the fan alone if the motor had an efficiency of 90%. (08 Marks)

Module-5

- 9 a. Explain how you carryout a ventilation survey in a district of a mine to ascertain the places and causes of leakage of air from the intake airways to the return airways before the working face is reached. (10 Marks)
 b. What are the factors that will influence the ventilation officer of a new mine :
 i) deciding the course for the ventilation
 ii) deciding the total quantity of air to be circulates. (06 Marks)

OR

- 10 a. a total quantity of 1960 m^3 of air/miniute passes in to split whose particular are as follows :
 Split $s_1 - 1.83\text{m} \times 1.525\text{m}$ and 457.5m long
 Split $s_2 - 1.83\text{m} \times 1.83\text{m}$ and 366.0m long
 Split $s_3 - 1.83\text{m} \times 1.22\text{m}$ and 320.25m long
 Split $s_4 - 1.525\text{m} \times 1.22\text{m}$ and 274.5m long.
 Calculate the quantity of air going in each split. Assume that ventilation pressure and co-efficient of friction for each split are identical. (08 Marks)
 b. The dry and wet bulb temperature recorded in a deep mine are as follows :

month	DC shaft		UC shaft	
	Dry	Wet	Dry	Wet
May	32	29	35.2	34
Dce	25	19	33	32.5

assume the avg quality of air circulated through the mine to be constant in the above two months at $8000\text{m}^3/\text{min}$, calculate the amount of water carried out by the ventilating air per day, given the water content of saturated air at normal atmosphere pressure is 33.5, 38.5, 33 and 35 g/m^3 at temperature at 32°C , 35.2°C , 25°C and 33°C respectively. (08 Marks)
