

B.E. Mining Engineering Sem-V
MN502 - Mine Climate Engineering

P. Pages : 2

Time : Three Hours



GUG/S/19/1652

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. Marks are indicated to the right.

1. Explain with neat sketch. **16**
- a) Flame safety lamp
 - b) Methane layering
 - c) Radon gas & its daughter products.

OR

2. Discuss **16**
- a) Classification of impurities in mine air.
 - b) Nitrous fumes - sources & physiological effects.
 - c) Infrared spectrometry
3. a) Discuss the effect of heat & humidity on miner. **8**
- b) Derive an expression for NVP by air density difference method. **8**

OR

4. a) A fan ventilating a heading through a duct of 600mm diameter circulates $4\text{m}^3/\text{s}$ of air at the face. Calculate the heat added to the mine air by the fan, if the input power of the fan is equal to 2.9 kw. **8**
- b) Define motive column. Derive an expression for NVP in terms of motive column. Calculate NVP in terms of motive column if NVP is 250 Pa. Assume suitable data if required. **8**
5. a) In a mine an airway has a square cross-section of 3 m side $2500\text{m}^3/\text{min}$ of air passes through it. The pressure is 1000 Pa. If the airway had a cross-section of $3\text{m} \times 4\text{m}$ and was of similar construction and roughness and of same length what will be the pressure spent for the same quantity of air flowing. **10**
- b) State the "ventilation standards" **6**

OR

6. a) Three splits in parallel of same cross -section and same type of roadway surface are respectively 300m, 600m and 900m long. Calculate the quantity of air which would flow in each if the total quantity is $200\text{m}^3/\text{min}$. **8**
- b) Explain with neat sketch construction and working of ventilation door and air crossing. **8**

7. a) Discuss the factors to be considered in the selection of main mine fans. **8**
- b) Explain operation of similar fans in series with the help of characteristic curves. Assume suitable data if required. **8**

OR

8. a) Calculate the pressure produced by a 3m dia fan running at 250 rpm and delivering 6000 m³/min of air if the blades are. **10**
- i) Radial
- ii) Bent backward at 35°
- iii) Bent forward at 35°
- Assume velocity of flow 3m/sec and air density 1.2 kg/m³.
- b) Explain the function and location of following in the mines. **6**
- i) Fan drift
- ii) Evasee
- iii) Booster fan
9. a) State the objective and steps in ventilation planning. **8**
- b) Explain Boundary ventilation system with neat sketch. Also state applicability merits and its demerits. **8**

OR

10. a) Explain the procedure of Estimation of total air quantity requirements of the mine. **8**
- b) Write short notes on. **8**
- i) Ventilation cost calculation.
- ii) Ventilation problems in deep mines.
