

GUJARAT TECHNOLOGICAL UNIVERSITY
B E Sem-VI Examination May 2011

Subject code: 162203

Subject Name: Sub-Surface Environment

Date: 19/05/2011

Time: 10.30 am – 01.00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Which are the noxious and poisonous gases met with a mine? Write a short note on Firedamp related to its origin, occurrence, physiological characters and testing methods. **07**
- (b) What is relative humidity? Explain the Hygrometer to determine relative humidity of air. **07**

- Q.2** (a) Which are the physiological effects of Carbon Monoxide? Explain detection method of it. **07**
- (b) Explain “Kata thermometer for the assessment of comfort conditions in mines.” **07**

OR

- (b) What are the characteristic curves? Explain “Fan characteristic curves”. **07**
- Q.3** (a) How is natural ventilating pressure produced? Explain by sketch “motive column” as applied to Natural ventilation pressure? **07**
- (b) What is Fan ventilation? Compare – Air screw Fan and Centrifugal Fan. **07**

OR

- Q.3** (a) Which are the necessities for the mine ventilations? List out the various devices used for distribution and control of air in a mine. Add a note on Sources of leakage of air. **07**
- (b) A mine fan having a capacity to circulate $25 \text{ m}^3/\text{s}$ of air in a mine at a pressure of 50 mm w.g. is to be assisted by a booster. The mine consists of two splits, A and B, A circulating $15 \text{ m}^3/\text{s}$ and B, $10 \text{ m}^3/\text{s}$. The object of the installing a booster in splits B is to increase the quantity in it to $15 \text{ m}^3/\text{s}$. Calculate the size of the booster if the resistance of the shafts and trunk airways is $0.02 \text{ k}\mu$. **07**

- Q.4** (a) What is the difference between an auxiliary fan and a booster fan? Show by sketches the installation of an auxiliary fan of (a) forcing type (b) exhaust type. **07**
- (b) Explain Ascensional and descensional ventilation with a neat sketch. Add a note on Air locks. **07**

OR

- Q.4** (a) Explain “splitting in underground workings”. Add a note on Ventilating district. **07**
- (b) The quantity of air going down a D. C. shaft is $900 \text{ m}^3/\text{min}$. The surface main ventilator develops water gauge of 50 mm. When the ventilator is stopped the air going down the shaft is $300 \text{ m}^3/\text{min}$. What is the N.V.P. assisting the fan? **07**

- Q.5 (a)** What problems arises in the working of a deep mine? What are the different refrigerants used in an air – conditioning plant? State their advantages and disadvantages. **07**
- (b)** What is the basic principle behind the pressure survey in a mine? Explain “Inclined manometer for the pressure ventilation survey”. **07**

OR

- Q.5 (a)** Give the laws which govern the passage of air in a mine. Write the short notes on Kilomurg and Equivalent orifice of a mine. **07**
- (b)** Two ventilation splits A and B pass 15 and 20 m³/s of air respectively with a pressure drop of 500 Pa across them. The trunk airways consume a pressure of 300 Pa. If the air flow in the two splits is to be equal by installing a regulator, calculate the size of regulator, assuming the fan pressure to remain constant before and after installation of a regulator. What will be the air flow in the mine after fitting of the regulator? **07**
