22252

12425

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Enlist different gases/damps found in underground mines.

(b) Enlist the parts of flame safety lamp.

(c) Define N.V.P. and motive column.

(d) State the gases detected by flame safety lamp. Can it detect carbon monoxide ?

(e) Define Splitting.

(f) Draw two conventional signs used in ventilation while preparing plan.

(g) Name the instrument used in measurement of air pressure in mines.

2. Attempt any TWO of the following : **12**

(a) Discuss the standards of ventilation.

(b) Describe the procedure to find relative humidity in underground mines.

(c) Describe Ascensional and Descensional ventilation in underground mines. Draw figure.

3. Attempt any TWO of the following : **12**

(a) Calculate the water-gauge (w.g.) developed and quantity delivered by a backward bladed centrifugal fan having following specifications :

Fan dia. 3.6 m, RPM 300

Width at periphery 1.5 m, Blade angle 40°, Velocity of flow 4.5 m/sec, Air density 1.2 kg/m^3.

(b) Describe the factors causing N.V.P. Write the formula for motive column & N.V.P.

(c) State different types of fan used in mines. Explain any one known to you.

4. Attempt any TWO of the following : **12**

(a) A mine is ventilated by two splits A and B having resistances 0.15 kilomurg and 0.60 kilomurg respectively. The resistance of trunk airways and shaft is 0.13 kilomurg and a total quantity of 2000 m^3/min of air flows through the mine.

If the ventilating pressure be 200 kg/m^2. What will be the pressure requirement of a booster fan to be installed in split B to increase the air flow in that split to 1500 m^3/min ?

(b) Describe the terms :

(i) Theoretical Depression

(ii) Manometric Efficiency

(c) State the laws of Mine Air friction. Mention Atkinson's formula.

5. Attempt any TWO of the following : **12**

(a) Discuss equivalent orifice in mines. Write the formula for equivalent orifice.

(b) A main mine fan develops a w.g. of 120 mm of which 80 mm is consumed in the shafts and the trunk airways and 40 mm is available to ventilate two splits A and B. The quantity of air passing split A is 15 m^3/s and that in split B is 10 m^3/s.

To increase the quantity in split B a booster is to be installed in it. Calculate the size of booster which will cause the stoppage of airflow in split A.

(c) Describe the Anemometer and its use in calculation of Air velocity.

6. Attempt any THREE of the following : **12**

(a) Three underground roadways in parallel spread out from a point near the bottom of a D.C. shaft and join at a point near the bottom of the U.C. shaft. The parallel roadways have resistances 9, 16, 25 kilomurg respectively.

The resistance of fan drift is 1 kilomurg and DC shaft and UC shaft 2 kilomurg and 3 kilomurg respectively including the connecting trunk roads.

Calculate the combined resistance of the whole mine. If the w.g. developed by fan is 153 mm. calculate the quantity of air that passes through the whole mine and through each split.

(b) Describe ventilation survey and its importance. State the relation between quantity of air 'Q', cross-sectional area 'A' and velocity of air 'V'.

(c) Draw conventional signs for

(i) Air crossing

(ii) Direction of air current

(iii) Water dam

(iv) Doors

(v) Auxiliary fan

(vi) Explosion proof air crossing

(vii) Drift

(viii) Fault

(d) A quantity of air going down a D.C. shaft is 900 m^3/min. The surface main ventilator develops a water-gauge of 50 mm. When ventilator is stopped the air going down the shaft is 300 m^3/min. What is the NVP assisting the fan ?

(e) Discuss the formation of gas caps of flame safety lamp in percentage test.

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