CBCS SCHEME

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15MN51

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. With a table list the composition of Atmospheric by percentage of volume and mass. **(08 Marks)**

b. Explain the different types of Mine gases occurrence , Properties , Detection. **(08 Marks)**

OR

2 a. A sample of mine air has the following volumetric composition $O_2 = 19.81\%$, $CO_2 = 0.92\%$ $CH_4 = 1.02\%$ and $N_2 = 78.25\%$. Calculate the composition by mass. What would be its composition (both by volume and by mass) if the air were saturated with water vapour at the sampling temperature at 303K and atmospheric pressure at 101.33 KPa. **(08 Marks)**

b. Define a Fire damp. Where do we find fire damp accumulated in underground mine? List out three types / groups of gassiness based on the Rate of methane emission. **(08 Marks)**

Module-2

3 a. Explain the objective of an underground mine ventilation. **(08 Marks)**

b. A total quantity of $100m^3$/min of air is passing through two splits one airway is 2.5m × 1.5m and 100m long and the other with similar lining is 2m × 1.5m and 125m long. Calculate the quantity of air passing in each split. **(08 Marks)**

OR

4 a. What will be the effect of heat and humidity on a miner when body temperature shoots up? **(08 Marks)**

b. What are the methods of improving the cooling power of a mine? Explain any one method elaborately. **(08 Marks)**

Module-3

5 a. Explain the fundamentals of air flow in a mine. **(08 Marks)**

b. Determine the nature of flow in a mine airway of 2.2 × 1.8m size if the velocity of the air in the airway is $0.5ms^{-1}$. Calculate the maximum velocity at which the flow still remains truly laminar. Assume the air to be at an atmospheric pressure of 101.33 KPa and at a temperature of 303K. **(08 Marks)**

OR

6 a. Explain the 'Reynolds number'. **(08 Marks)**

b. Explain the pressure losses due to Shock Resistance. **(08 Marks)**

Module-4

7 a. Calculate the natural ventilating pressure in a mine given the following data :
Depth of mine = 300m , Pit bottom barometer reading = 101.27 Kpa , Pit – top barometer reading = 98.10 Kpa , Average temperature in DC shaft = 304K and Average temperature in VC shaft = 307K. **(08 Marks)**

b. Mean temperature in a DC shaft 400m deep is 28^0C and in VC shaft it is 38^0C. Calculate motive column NVP if pressure in DC is 750 mm Hg. **(08 Marks)**

OR

8 a. What are Evasee and Diffusers? Explain them. **(08 Marks)**

b. With a sketch, explain working and application of booster fans in underground. **(08 Marks)**

Module-5

9 a. Explain the importance of Ventilation Survey. **(08 Marks)**

b. Explain the different types of ventilation systems used in mines. **(08 Marks)**

OR

10 a. 15 kg of explosives is fired in a 2 × 2.5m drive which is 100m long. Calculate the quantity of air to be circulated by a auxiliary fan to bring down the concentration of nitrous fumes in the drive to the tolerable limit of 5.P P.m within a period of 5 minutes 'A' kg of explosives produces 2000 cm^3 of nitrous fumes. **(08 Marks)**

b. Explain the pressure surveys required for ventilation planning. **(08 Marks)**

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