Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

USN

Fifth Semester B.E. Degree Examination
Mine Ventilation

TIME: 03 Hours   **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module – 1	
Q.1	**(a)**	Discuss the occurrence, properties and physiological effects and detection method of stink damp	08
	(b)	Explain a suitable chemical analysis air sampling method to be used if the sample quantity is small with diagram	08
	(c)	Classify the degree of gassiness in coal mine	04
		OR	
Q.2	**(a)**	Discuss the occurrence, properties and physiological effects and detection method of Carbon monoxide	08
	(b)	With sketch, summarize the simplest and cheapest method of methane drainage system	08
	(c)	Samples of air collected in the intake and return gates of an advancing longwall face shows 0.2 and 0.7% CH4 respectively. Calculate per tonne of coal mines, if the production from the face averages 1000 t per day and an air quantity of 20 m^3s^{-1} circulates along the face.	04
		Module – 2	
Q.3	**(a)**	Identify the different sources of heat in mines and discuss the sources in detail	10
	(b)	Discuss the effects of heat and humidity on the miners	10
		OR	
Q.4	**(a)**	Explain the method to measure cooling power of air and velocity of air with neat diagram	08
	(b)	Discuss the following i. Relative Humidity ii. Dry-Bulb Temperature iii. Wet-Bulb Temperature iv. Dew point	08
	(c)	Assuming density of water to be 1000 kg/m³, calculate amount of heat added to the mine air by the following: a) 200 kW main underground pump pumping water at 5 m³/min through a head of 150 m, b) A diesel LHD operating on level ground and consuming 7.5 kg of fuel per hour; heat content of the fuel is 40.1 MJ kg⁻¹, c) A 4-kW battery locomotive operating on a level roadway, assume load factor of 0.3.	04
		Module – 3	
Q.5	**(a)**	Identify the basic combination of connecting the airways in underground mines, discuss each with neat sketches	10

	(b)	Discuss the various factors to be considered for economic designing of mine airways	10
		OR	
Q.6	**(a)**	Derive an expression for equivalent orifice	10
	(b)	An unlined roadway in hard rock, 2.8 x 3m in cross-section and 600 m long has two right angle square bends with square inner corners. It has also a door frame (without any door) of 1.5 x 2m size installed in a stopping. Calculate the pressure required to circulate 10 $m^3 s^{-1}$ of air through the roadway. Assume coefficient of friction k=0.0098 N $s^2 m^{-4}$ for unlined airway in hard rock.	10
		Module – 4	
Q.7	**(a)**	Identify the factors for the causes of natural ventilation and discuss each in detail	10
	(b)	Two vertical shafts each 6m in diameter and 300m deep are connected at the bottom by a level 2 x 2.5m in cross-section and 800m long. The average barometric pressure in the shafts being 101.325 kPa. Calculate the velocity of flow in the level due to natural ventilation. Temperature measurements in the shafts are as follows: Downcast shaft-top = 293 K Downcast shaft-bottom = 296 K Upcast shaft-top = 303 K Upcast shaft-bottom = 303.5 K Coefficient of friction k for shafts is 0.004 N $s^2 m^{-4}$ and for level k is 0.01 N $s^2 m^{-4}$.	10
		OR	
Q.8	**(a)**	Explain the different methods to control the capacity of fan	10
	(b)	With diagram, discuss the modder deep type of Venturi blower	10
		Module – 5	
Q.9	**(a)**	Explain the steps involved in planning the ventilation	10
	(b)	Discuss the type of ventilation system to be adopted if both intake and return shafts are located close by at the centre of the property	10
		OR	

Q.10	**(a)**	Explain the factors that will influence the ventilation officer of a new mine in
		    a) deciding the course for the ventilation and
		    b) deciding the total quantity of air to be circulated
			10

	(b)	A total airflow of 30 m^3/s splits into two airways, measuring respectively 4m x 2.5m x 900m and 4.2m x 2.5m x 1100m. Calculate the airflow in each split.	5
	(c)	A mine has only one district at a distance of 500 m from the bottom of the shafts. The average size of roadways is 4.3m x 2.7m and the average velocity of air therein is 320 m/min. Find out the pressure difference at the pit-bottom (value of K=0.0001).	5

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome				
Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Programme Outcome**
Q.1	(a)	Understanding	CO1	PO1
	(b)	Understanding	CO1	PO2
	(c)	Understanding	CO1	PO1
Q.2	(a)	Understanding	CO1	PO1
	(b)	Applying	CO1	PO12
	(c)	Applying	CO1	PO1
Q.3	(a)	Applying	CO2	PO7
	(b)	Understanding	CO2	PO7
Q.4	(a)	Understanding	CO2	PO2
	(b)	Understanding	CO2	PO1
	(c)	Applying	CO2	PO1
Q.5	(a)	Applying	CO3	PO1
	(b)	Understanding	CO3	PO6
Q.6	(a)	Understanding	CO3	PO1
	(b)	Applying	CO3	PO6
Q.7	(a)	Applying	CO4	PO6
	(b)	Applying	CO4	PO1
Q.8	(a)	Understanding	CO4	PO1
	(b)	Understanding	CO4	PO1
Q.9	(a)	Understanding	CO5	PO5
	(b)	Understanding	CO5	PO1
Q.10	(a)	Understanding	CO5	PO1
	(b)	Applying	CO5	PO6
	(c)	Applying	CO5	PO1

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6