

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Mine Ventilation	Semester: IV
Program: B.Tech. in Mining Engineering	Time: 03 hrs.
Course Code: PEMI 2007	Max. Marks: 100
Instructions: As specified for each sections	

SECTION A (Answer ALL)

S. No.		Marks	CO
Q1. a)	Define: Firedamp, Whitedamp, Stinkdamp, Blackdamp and Afterdamp.	5	CO1
b)	Identify the Sources of Moisture in Mines.	5	CO2
c)	Explain Chezy-Darcy equation for Turbulent flow.	5	CO3
d)	List the advantages of Boundary Ventilation System.	5	CO6

SECTION B (Answer 2, 3, 4 and 5 or 6)

Q2. a)	State the CMRs for General Precautions in gassy mines.	7	CO1
b)	Explain the Index of Climate Conditions in mines.	3	CO2
Q3. a)	State the CMRs for Splits, Brattice, Stoppings and Air-crossing in ventilation.	6+4	CO5
b)	Analyze the steps to increase the quantity of air flowing through mines.		
Q4.	Summarize the essential features of a good ventilation system.	10	CO6
Q5. a)	Identify the parameters to select a Fan.	4+6	CO4
b)	Outline the CMRs of drive and fittings of the Main Mechanical Ventilator.		

OR

Q6.	A mine is ventilated by a fan running at 300 RPM and generating a quantity of 6000 m ³ /min at 75 mm w.g. The fan absorbs 160 BHP. To increase the quantity of air, the fan is speeded up to 400 RPM. Calculate the new quantity, pressure generated and BHP. Also, calculate the efficiency of the fan.	10	CO4
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SECTION-C (Answer 7 and either 8 or 9)

Q7. a)	Assuming your conditions, show with a diagram the ventilation arrangements and flow through an underground Bord & Pillar district. Justify your statements.	10	CO5
b)	List different steps involved in Ventilation Planning.	10	CO6
Q8. a)	Discuss the CMRs for Installation and Maintenance of Main Mechanical Ventilator.	10+10	CO4
b)	Two parallel splits A and B have a pressure of 500 Pa acting across them, causing a		

	flow of 15 m ³ /s and 10 m ³ /s of air in split A and B, respectively. It is decided to put a Regulator in split B to decrease the quantity to 10 m ³ /s in split A. Calculate the quantity in split B after the installation of Regulator and size of the Regulator if surface fan pressure is 1 kPa.		
	OR		
Q9.	<ul style="list-style-type: none"> a) Differentiate between Axial Flow fans and Centrifugal fans. b) Illustrate the principles for the installation of the Booster fan. c) A mine fan produces a pressure of 500 Pa and passes 25 m³/s of air through the trunk roadway that has two splits at its end. Split A and split B are having 15 m³/s and 10 m³/s of air, respectively. It is decided to put a Booster fan at split B to increase the quantity upto 15 m³/s. Calculate the size/pressure of the Booster fan if the resistance of shaft and trunk roadway is 0.2 N s²m⁻⁸. 	5+7+8	CO4

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SECTION A (Answer ALL)

S. No.		Marks	CO
Q1. a)	Define various Degree of Gassiness for a U/G Coal Mine.	5	CO1
b)	Summarize the Chezy-Darcy equation.	5	CO2
c)	Identify the sources of heat from rocks.	5	CO3
d)	State the CMRs on Auxiliary Fans.	5	CO4

SECTION B (Answer 2, 3, 4 and 5 or 6)

Q2. a)	Define Methane Layering. Explain the factors on which the layering depends.	7+3	CO1
b)	List the physiological effects of CO in mines.		
Q3. a)	Summarize the sources of Heat from rocks.	6+4	CO2
b)	Define SVP and Kata factor.		
Q4. a)	Derive the equation of pressure loss for a steady, laminar flow stating your conditions.	7+3	CO3
b)	What is the importance of Reynolds Number?		
Q5. a)	Illustrate the factors for Natural Ventilation.	6+4	CO4
b)	Differentiate between Centrifugal and Axial flow fans.		

OR

Q6.	Two vertical shafts each having a diameter of 5 m, and length of 250 m are connected by a level roadway of $3 \times 5 \text{ m}^2$ cross section and 500 m long at bottom. The barometric pressure in the shaft is 101.3 kPa, average temperatures for the upcast and downcast shafts are 304 K and 295 K respectively. Calculate the velocity of flow due to natural ventilation ignoring shock loss. Given: $K(\text{shaft}) = 0.004 \text{ N s}^2/\text{m}^8$ and $K(\text{level}) = 0.01 \text{ N s}^2/\text{m}^8$.	10	CO4
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SECTION-C (Answer 7 and either 8 or 9)

Q7. a)	State the Standards of Ventilation.	12	CO1
b)	Describe the installation of a Booster fan.	8	CO4
Q8. a)	Summarize the CMRs for installation of Brattice, Door, Stoppings and Air-crossing.	10	CO5
b)	Select the essential features of a good ventilation system.	10	CO6
OR			
Q9. a)	Describe with sketches, various methods to ventilate the Headings in underground.	10	CO5
b)	Analyse the Importance of and the Parameters to be measured in Ventilation Survey.	10	CO6