UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, December 2020

Course: Material Handling System **Semester: VII**
Programme: B. Tech (Mining Engineering) **Time: 03 hrs.**
Course Code: GSEG 421 **Max. Marks: 100**

SECTION A

1. Each Question will carry 5 Marks
2. Instruction: Complete the statement / Select the correct answer(s)

Sl. No.	Question	CO
Q 1	(A) What is the wind per hour for medium duty winder (i.) > 200000 (ii.) 10000 to 200000 (iii.) < 10000 (iv.) 250000 (B) What is the maximum working depth in m of deep mines winder (i.) 500 (ii.) 500 to 1000 (iii.) 1000 to 1500 (iv.) > 1500 (C) Which of the following is the recommended power requirement for the Blair Winder (i.) 12000 kW (ii.) 6000 to 8000 kW (iii.) 2000 Kw (iv.) 3000 to 4000 kW (D) Distance between two hoist rope in friction winder is (d = rope diameter) (i.) 10 d (ii.) 100 d (iii.) 50 d (iv.) 90 d (E) Which of the following is the angle of wrap for ground mounted Koepe (i.) 120 to 160 degree (ii.) 180 to 195 degree (iii.) 60 to 90 degree (iv.) 100 to 150 degree	**CO1**
Q 2	(A) Which of the following grade of belt is suitable for superior resistance to cutting, gauging and abrasion (i.) Grade M24 (ii.) Grade N17 (iii.) Grade HR	

	(iv.) Grade FRAS
	(B) The disadvantages of chain conveyor is
	  (i.) Chain easily wraparound sprockets of small diameter
	  (ii.) No slippage takes place between chain and sprocket
	 (iii.) Limited running speed
	 (iv.) None
	(C) What is the maximum capacity of chain conveyor is
	  (i.) 100 t/hour
	  (ii.) 200 t/hour
	 (iii.) 300 t/hour
	 (iv.) 400 t/hour
	(D) Which of the following is a type of arm conveyor
	  (i.) Pendent Conveyor
	  (ii.) Removable-Crossbar Conveyor
	 (iii.) Swing Tray Conveyor
	 (iv.) All
	(E) Ropeways are normally driven in sections of about
	  (i.) 8 km
	  (ii.) 10 km
	 (iii.) 15 km
	 (iv.) 4 km
		CO1

Q 3	(A) Which of the following is the classification of Scraper Haulage
	  (i.) Two Drum Hoist
	  (ii.) With Obstacle
	 (iii.) Three Drum Hoist
	 (iv.) All
	(B) Which of the following is correct for Ski Lift System
	  (i.) Two way men riding simultaneously
	  (ii.) A distance of 15 m is maintained between two chairs
	 (iii.) Both
	 (iv.) None
	(C) Which of the following man riding system is equipped with detachable chairs for gradients up to 45° and vertical curves
	  (i.) Apod I
	  (ii.) Apod II
	 (iii.) Apod III
	 (iv.) All
	(D) Shuttle car can work nicely up to a gradient of
	  (i.) 60 degree
	  (ii.) 90 degree
	 (iii.) 120 degree
	 (iv.) 145 degree
	(E) Maximum travel speed of Side Discharge Loader is
	  (i.) 2.6 kmph
	  (ii.) 4.6 kmph
	 (iii.) 6 kmph
		CO1

	(iv.) 3.6 kmph	
Q 4	(A) What is the recommended rope diameter for double drum AC hoist if the drum diameter is 3.2 m (i.) 28 to 40 mm (ii.) 24 to 30 mm (iii.) 20 to 25 mm (iv.) 36 to 44 mm (B) Rope slippage is less when (i.) T1/T2 is more (ii.) T1/T2 is less (iii.) T1/T2 is zero (iv.) None (C) What of the formula is correct for the anti-slip condition in static case (i.) 1.1Q-Q0+pH (ii.) 1.1Q+Q0+pH (iii.) 1.1Q-Q0-pH (iv.) 1.1Q+Q0-pH (D) What is the limit of anti-slip condition in the dynamic case (i.) 1.55 (ii.) 1.25 (iii.) 1.35 (iv.) 1.45 (E) What is the acceptable tread pressure (i.) 5 to 10 kgf/cm^2 (ii.) 11 to 15 kgf/cm^2 (iii.) 17 to 20 kgf/cm^2 (iv.) 21 to 26 kgf/cm^2	**CO2**
Q 5	(A) Which of the following is the formula of drive factor in belt drive system (i.) $1-e^{\mu\theta}-1$ (ii.) $1/e^{\mu\theta}-1$ (iii.) $1*e^{\mu\theta}-1$ (iv.) $1+e^{\mu\theta}-1$ (B) Cross sectional area of the cable conveyor is determined using the formula as (i.) C/b*v (ii.) C/b+v (iii.) C*b*v (iv.) None (C) Frictional coefficient in the chain conveyor depends upon (i.) Sliding of chain (ii.) Rolling of chain (iii.) Both (iv.) None (D) Rolling friction of the chain conveyor depends on (i.) Roller Size (ii.) Condition of Track (iii.) Both	**CO2**

	(iv.) None	
	(E) Load spacing in mono cable ropeway is determined as	
	(i.) Speed*Load time interval	
	(ii.) No. of car*Load/h	
	(iii.) Load time interval *Load/h	
	(iv.) Total line length/ Load/h	
Q 6	(A) Which of the following is the important factor for the rope selection in mono cable ropeway	
	(i.) Bending Stress	
	(ii.) Stress due to Cumulative Tension	
	(iii.) Both	
	(iv.) None	
	(B) What is the range of station friction in mono cable ropeway	
	(i.) 2.5 to 6 kW	
	(ii.) 3.5 to 4 kW	
	(iii.) 1.5 to 4 kW	
	(iv.) 1.5 to 8 kW	
	(C) The load haul dumper got acceptance in the metal mining operation because of	
	(i.) Flexibility	
	(ii.) Mobility	**CO2**
	(iii.) Versatility	
	(iv.) All	
	(D) The application of load haul dumper is	
	(i.) In Stope	
	(ii.) In level	
	(iii.) Between level	
	(iv.) All	
	(E) Fixed time in load haul dumper includes	
	(i.) Loading	
	(ii.) Turning	
	(iii.) Dumping	
	(iv.) All	

SECTION B

1. Each question will carry 10 marks
2. Instruction: Write short / brief notes

Q 7	Describe in detail the construction features, advantages and disadvantages of load haul dumper (LHD) with neat sketch.	
	OR	**CO1**
	Describe in detail the construction features of shuttle cars and side discharge loader (SDL) with neat sketch.	
Q 8	Explain in detail the three-phase speed-time and load-time diagram in hoisting system with neat sketch.	**CO2**
Q 9	Determine the power requirement in bi-cable ropeway when transporting the material uphill and downhill with ropeway of capacity 130 t/h, station friction power is 3 kW, line length 800 m and difference in level between loading and discharge station is 200 m.	**CO3**

Q 10	A cable belt conveyor is conveying the lump coal material of bulk density 0.8 t/m^3 at the rate of 100 t/h up a drift 1.2 km in length. The total lift is 200 m. The following project data are available as: Mass of the belt = 25 kg/m Mass of the wire rope = 5.06 kg/m Equivalent mass of the line stand pulley = 80 kg/m Coefficient of friction = 0.015 Maximum size of lump material = 210 mm (as per CEMA) Drive efficiency = 90 % Determine the motor power to convey the material.	**CO3**
Q 11	A LHD machine employed on open stope loading, operating on a zero grade under average haul road conditions. (a) Ore density: 1.9 t/m^3 (b) Bucket Capacity: 3 m^3 (heaped) but allow a 85 % fill factor for conditions (c) Constant speed: 9.5 km/h (d) One-way haul distance: 170 m (e) Acceleration: 0.4 m/s^2 (f) Deceleration: 0.7 m/s^2 (g) Estimated loading time: 30 s (h) Estimated dumping time: 20 s Calculate productivity potential of a LHD machine under above conditions?	**CO3**

SECTION-C

1. Each Question carries 20 Marks.
2. Instruction: Write long answer.

Q 12	A ground mounted friction winder have a hoisting capacity 250 t/h. The drive is powered by twin motor directly connected to the friction drum. The following project data are available as: (a) Shaft Depth = 920 m, (b) Cage weight = 4.8 t (c) Pay load = 6.0 t (d) Dump car weight = 3 t (e) Friction wheel diameter = 6.44 m (f) Weight of friction wheel = 14.3 t (g) Acceleration = 0.9 m/s^2 (h) Retardation = 1 m/s^2 (i) Rope weight = 10.1 kgf/m (j) GD2 of deflector pulley = 53.87 tm^2 (k) GD2 of winder motor = 106 tm^2 (l) Radius of gyration = 0.67 (m) Maximum rope speed = 16 m/s (n) Deflector pulley diameter = 5 m Find the following using above hoisting capacity and project data (i) Motor Capacity (ii) Motor Speed (iii) Total Time (iv) Length of the path transverse at steady speed and (v) Total referred flywheel moment required for a ground mounted friction winder	**CO4**

<div align="center">OR</div>

Consider a drum winder is used to hoist the material from underground mines. The following project data are given as:

(a) H = 230 m,
(b) Payload(Q) = 4000 kgf,
(c) Weight of the skip (Q_0) = 3950 kgf,
(d) Weight of the main rope (p) = 3.1 kgf/m,
(e) Rope breaking strength (B) = 57200 kgf,
(f) Double drum winder diameter = 3 m,
(g) Width = 1.5 m (2 x 3 x 1.5),
(h) Gear ratio = 30,
(i) Motor = 200 Kw and
(j) GDm2 = 120 kgfm².

Find (i) the factor of safety (ii) the static unbalanced load of the system (iii) maximum tension (iv) equivalent mass of the system (v) dynamic load when a is 1.22 m/s².