



**SET 1**

Name:			
Enrolment No:			
<b>UNIVERSITY OF PETROLEUM AND ENERGY STUDIES</b> <b>End Semester Examination, December 2018</b>			
<b>Course: B. Tech (Mining Engineering) B1</b>		<b>Semester: VII</b>	
<b>Programme: Material Handling System</b>		<b>Course Code: GSEG 421</b>	
<b>Time: 03 hrs.</b>		<b>Max. Marks: 100</b>	
<b>Instructions: All questions are compulsory</b>			
<b>SECTION A</b>			
S. No.		Marks	CO
Q 1	Explain in brief the single rope friction winder with suitable sketch?	4	CO1
Q 2	Describe Pitbottom circuit in brief?	4	CO2
Q 3	Evaluate the belt drive factor for coefficient of sliding friction 0.25 and wrap angles (i) 180 degree (ii) 390 degree respectively?	2 + 2	CO3
Q 4	Describe the construction features of mono-cable ropeway in brief?	4	CO5
Q 5	Comments on selection factors of load haul dumper (LHD)?	4	CO6
<b>SECTION B</b>			
Q 6	Describe the power distribution between two pulleys in double pulley belt conveyor system and support your argument with neat sketch?	10	CO3
Q 7	Determine the motor power of shaker conveyor of length 50 mm, if the conveyor is conveying lump coal material of maximum size 210 mm, bulk density 0.8 t/h, stroke frequency 2 Hz, and drive efficiency 80 %.	10	CO4
Q 8	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.	10	CO5
Q 9	Describe in detail the construction features, advantages and disadvantages of load haul dumper (LHD).	10	CO6
Q 10	OR Describe in detail the construction features of shuttle cars and side discharge loader (SDL).	10	
<b>SECTION-C</b>			
	A ground mounted friction winder have a hoisting capacity 250 t/h. The drive is		

Q 11	<p>powered by twin motor directly connected to the friction drum. The following project data are available as:</p> <p>(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<sup>2</sup>  (h) Retardation = 1 m/s<sup>2</sup>  (i) Rope weight = 10.1 kgf/m  (j) GD2 of deflector pulley = 53.87 tm<sup>2</sup>  (k) GD2 of winder motor = 106 tm<sup>2</sup>  (l) Radius of gyration = 0.67  (m) Maximum rope speed = 16 m/s  (n) Deflector pulley diameter = 5 m</p> <p>Find the following using above hoisting capacity and project data</p> <p>(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</p>	<p><b>4 + 4 + 4 + 4 + 4</b></p>	<p><b>CO2</b></p>
Q 12	<p>(a) Explain in detail the three phase speed-time, load-time and power-time diagram in hoisting system.  (b) Explain in detail the different types of pit-top mine circuits with suitable sketch.</p> <p style="text-align: center;">OR</p> <p>(a) Describe in detail the construction features of scraper haulage with neat sketch.  (b) A cable belt conveyor is conveying the lump coal material of bulk density 0.8 t/h 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:  (a) Mass of the belt = 25 kg/m  (b) Mass of the wire rope = 5.06 kg/m  (c) Equivalent mass of the linestand pulley = 80 kg/m  (d) Coefficient of friction = 0.015  (e) Maximum size of lump material = 210 mm (as per CEMA)  (f) Drive efficiency = 90 %</p> <p>Determine the motor power to convey the material.</p>	<p><b>10 + 10</b></p> <p><b>10 + 10</b></p>	<p><b>CO4</b></p>

**SET 2**

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<b>Programme: Material Handling System</b>		<b>Course Code: GSEG 421</b>	
<b>Time: 03 hrs.</b>		<b>Max. Marks: 100</b>	
<b>Instructions: All questions are compulsory</b>			
<b>SECTION A</b>			
S. No.		Marks	CO
Q 1	List advantages and disadvantages of multirope friction winder?	4	CO1
Q 2	Identify construction features of skip? Give technical specifications.	2+2	CO2
Q 3	Given: Coefficient of sliding friction 0.25 and for angle of contact 230 degree. Calculate drive factor of belt conveyor?	4	CO3
Q 4	What are the applications of vibrating conveyor?	4	CO5
Q 5	Describe the specifications of side discharge loader (SDL) and its applications.	4	CO6
<b>SECTION B</b>			
Q 6	Draw a suitable sketch for a) three-phase speed-time, b) load-time and c) power-time in hoisting system? Explain each of them, separately.	1+2+1+6	CO2
Q 7	Given: Maximum effective tension 27.51 kN, Wrap angle 220 degree, Coefficient of sliding friction 0.621 and belt speed 3 m/s. Determine, a) Maximum tight side tension? b) Slack side tension? and c) Power transmitted to the belt conveyor?	10	CO3
Q 8	Explain the characteristic features, advantages and disadvantages of cable belt conveyor.	10	CO4
OR			
Q 9	Consider the material is transported in mines using the bi-cable ropeway. Given data: a) Ropeway of capacity 130 t/h, b) Station friction power is 3 kW, c) Line length 800 m and d) Difference in level between loading and discharge station is 200 m.		

	Calculate power requirement in bi-cable ropeway when transporting the material i) uphill and ii) downhill	<b>5 + 5</b>	
Q 10	A LHD machine employed on open stope loading, operating on a zero grade under average haul road conditions. (a) Ore density: $1.9 \text{ t/m}^3$ (b) Bucket Capacity: $3 \text{ m}^3$ (heaped) but allow a 85 % fill factor for conditions (c) Constant speed: $9.5 \text{ km/h}$ (d) One-way haul distance: $170 \text{ m}$ (e) Acceleration: $0.4 \text{ m/s}^2$ (f) Deceleration: $0.7 \text{ m/s}^2$ (g) Estimated loading time: $30 \text{ s}$ (h) Estimated dumping time: $20 \text{ s}$ Calculate productivity potential of a LHD machine under above conditions?	<b>10</b>	<b>CO6</b>
<b>SECTION-C</b>			
Q 11	Consider a drum winder is used to hoist the material from underground mines. The following project data are given as: (a) $H = 230 \text{ m}$ , (b) Payload(Q) = $4000 \text{ kgf}$ , (c) Weight of the skip ( $Q_0$ ) = $3950 \text{ kgf}$ , (d) Weight of the main rope (p) = $3.1 \text{ kgf/m}$ , (e) Rope breaking strength (B) = $57200 \text{ kgf}$ , (f) Double drum winder diameter = $3 \text{ m}$ , (g) Width = $1.5 \text{ m}$ ( $2 \times 3 \times 1.5$ ), (h) Gear ratio = $30$ , (i) Motor = $200 \text{ Kw}$ and (j) $\text{GDm}^2 = 120 \text{ kgfm}^2$ . 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 $1.22 \text{ m/s}^2$ .	<b>4+4+4+4+4</b>	<b>CO2</b>
Q 12	(a) Describe in details the constructional features of Head Gear using neat sketch. (b) Find the static tensions at each point when distance traveled by the cage/skip are given as: $0, 70, 150, 225$ and $300 \text{ m}$ , weight of payload is $2000 \text{ kgf}$ , winding depth is $300 \text{ m}$ , weight of the main rope is $3.24 \text{ kgf/m}$ , weight of the tail rope is $0 \text{ kgf/m}$ and resistivity force due to friction and windage is $1.2$ . Also, compare the static tensions at all these points when weight of the tail rope is $2.4 \text{ kgf/m}$ .	<b>10+10</b>	<b>CO5</b>
	<b>OR</b>		
Q 13	(a) Explain in details the constructional features of Bi-cable ropeway (b) Determine the motor power to convey the lump coal material of bulk density $0.8 \text{ t/h}$ at the rate of $100 \text{ t/h}$ up a drift $1.2 \text{ km}$ in length, with a total lift of $200 \text{ m}$ . The mass of the belt is $25 \text{ kg/m}$ , mass of the wire rope is $5.06 \text{ kg/m}$ , equivalent	<b>10 + 10</b>	

	mass of the linestand pulley is 80 kg/m, coefficient of friction is 0.015. Assume maximum size of lump material as 210 mm (as per CEMA) and drive efficiency 90 %.		
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