



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

COURSE NO: MN/MC 263
COURSE NAME: MINE MACHINERY
CLASS: MN/MC 263

TIME: 3 HOURS

Name: _____ Index Number: _____

Attempt all questions

1. Compare a dump truck and belt conveyor using the following criteria: productivity per hour, size of the material and working distance **[12 Marks]**
2. Draw a conveyor belt and identify the following component: carrying idlers, impact idlers, gravity take up pulley and return idlers. **[5 Marks]**
3. Give one example each of machinery that can be used for auxiliary operation in mining; for each example, specify in which auxiliary operation the machinery is used. **[4 Marks]**
4. Give one example each of mining machinery for surface excavating –loading with:
 - (a) cyclic operation
 - (b) continuous operation**[8 Marks]**
5. Give a classification of drilling machine according to the mode of interaction of the massive rocks and the bits.. What are the four basic components of a drilling machine? **[7 Marks]**
6. Answer **True** or **False** for following questions **[30 Marks]**
 - (i) Dozers/rippers, scrapers, motor graders are used for excavation and removal of top soils.
 - (ii) Open bowl scrapers seldom require a push-cat.
 - (iii) Dozers blade can be straight or U shaped
 - (iv) Bulldozers are used as raise boring machine in large ore body development.
 - (v) The most common components of a discrete unit haulage cycle are: excavate, load, haul, dump, and return.
 - (vi) The struck capacity of a truck is the volume of material when it is filled to the top, but with no material above the sides or carried on any external attachments such as bucket teeth.
 - (vii) The heaped capacity is a function of the material properties and the shape of the hauling unit.
 - (viii) The fill factor corrects the capacity of the bucket to the actual volume of material it moves by taking into consideration the material heaping characteristics, the angle of repose, and the skill of the operator in filling the bucket.

- (ix) The boom of an electric rope shovel is pinned to the housing at the bottom of the boom and is held at the top by support cables.
 - (x) The swell factor represents the fractional increase in material volume that occurs when it is fragmented and removed from its natural state (bank volume) and deposited in a loosened state (loose volume).
 - (xi) The swell factor can affect the volume of the material in the bucket of a shovel.
 - (xii) The pulleys that keeps the belt free from materials sticking to the belt.
 - (xiii) A percussion drilling involves rock crushing
 - (xiv) A rotary drilling involves rock chipping
 - (xv) The factors affecting the drilling performance are: the mining method and the economic value of the ore body.
7. A given mining company exploits copper ore using open pit method (surface mining). The expected production is 25,000 tons per day. The processing plant is located approximately at 8 km away from the pit. The maximum grade ability of the hauling path is 12° (degree). Among the following equipment, which one is the most suitable for hauling operation: train, backhoe, scraper, bulldozer and dump truck? Explain your answer **[5 Marks]**
8. In a given underground mine, the ore is extract by sublevel caving method. Drilling and blasting method is used for ore production with 2 shifts of 6 hours per day. Raises have been constructed. The drilling conditions are as follows: blast whole depth is 25 meters deep, the whole diameter is 102 mm, and the rock is hard rock. Which of the following machineries is the most suitable for drilling?: a raise boring machine, a jack hammer, a crawler mounted top hammer, a rotary drill and underground drill rigs with fully mechanized rod handling? Provide explanation for your answer **[5 Marks].**
9. From the given shovels: 18, 20, 25, 45 and 60 m³ bucket capacity, select the appropriate one for a bauxite mine using shovel-truck production equipment. The production data are: required production in bank: 30,000 tons/shift; shift operating time: 7hr; availability of the shovel: 50min/hr; muck: medium digging; cycle time 34 sec; bank density: 2.0 tons/yd³; loose density: 1.30 tons/yd³; swing angle: 120° . **[24 points]**