

BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR
B.E. 7TH SEMESTER (MinE) FINAL EXAMINATIONS, 2011
Computer Application in Mining (MN 704)

Full Marks: 70

Time: 3 hrs

Use separate answer script for each half
Question Nos. 1 & 6 are compulsory
Answer FOUR questions from the rest, taking TWO from each half
Marks are indicated on the right margin of the questions

First Half

1. a) Express the followings:
- i) Reliability in terms of failure rate
 - ii) Mean time to failure in terms of reliability
- b) Write the differences between the two of the followings:
- i) System and Process
 - ii) Discrete system and Discrete-event system
 - iii) System Environment and State of a System

[2×2+3×3=13]

2. a) What do you mean by Simulation? What are the different simulation models?
A mining company produces around 100 wagons of coal. The daily production varies from 96 to 104 wagons depending upon the manpower, availability of raw materials and other working conditions:

Production (per day):	96	97	98	99	100	101	102	103	104
Probability	: 0.04	0.09	0.12	0.14	0.11	0.10	0.20	0.12	0.08

Coal is transported through rail consisting of 100 wagons. Using following random numbers:

68 69 61 57 80 81 76 75 64 43 18
26 10 12 65

Simulate the process to find out:

- (i) What will be the average wagons of coal waiting in the coal handling plant?
- (ii) What will be the average number of empty wagons in the rail?

[3+8=11]

3. a) What do you mean by reliability?
- b) Explain 'bathtub hazard rate curve' to represent the failure rate of various types of engineering items.
- c) Assume that a mining system is composed of 5 independent and identical subsystems in series. The constant failure rate of each subsystem is 0.0006 failures per hour. Calculate the mining system mean time to failure and reliability for a 100-h mission.

[1+5+5=11]

4. a) What are the commonly used fault tree symbols?
b) Elaborate with a suitable example.
c) In your example calculate the probability of occurrence of the undesirable event, if all basic fault events occur independently and occurrence probability of each one is 0.12.

[2+4+5=11]

5. a) What are the different kinds of reliability networks?
b) Write the probability mass functions of 'Binomial Distribution' and 'Poisson Distribution' and also explain the corresponding reliability networks which obey these distributions.
c) An open pit system has two independent and identical shovels forming a parallel configuration. The shovel constant failure rate is 0.008 failures per hour. Calculate the shovel parallel configuration reliability for a 200-h mission

[2+2×3+3=11]

SECOND HALF

- 6 a) Give an account of the fields of computer applications in mining .
b) State why computer application is essential in mine planning and design.
c) What are the data requirements for open pit design in a mine planning software?
(3+7+3)
7. a) Write a short note on different ore body modeling techniques ?
b) Discuss how database for ore body modeling is developed?
(9+2)
- 8 a) What are the factors on which ultimate pit limit will depend ?
b) Discuss the two pit optimization techniques used in different mine planning software
(2+9)
- 9 a) Name four mine planning software widely used in the mining industry across the world.
b) What are the data requirement for pit design module in a mine planning software?
(2+9)
- 10 a) What are the steps involved in production planning and scheduling in a mine planning software?
b) What is net economic block value in an ore body constrained block model? How these values are assigned to each user defined blocks?

(5+6)