ROYAL CIVIL SERVICE COMMISSION

CIVIL SERVICE COMMON EXAMINATION (CSCE) 2009

EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALIZATION PAPER for MINING

Date : 8/11/2009
Maximum Marks : 100
Examination Time : 2.5 Hours
Reading Time : 15 Minutes

READ THE FOLLOWING GUIDELIINES CAREFULLY

1. Do not write for the first 15 minutes. This time must be spent in reading the question paper and to check whether all questions area in order and pages are complete.

2. The maximum time allotted for writing this paper is 2.5 hours.

3. All answers to the questions must be written in a separate **Answer Sheet** provided.

4. Do not tick the answers for the object questions on the question paper.

5. This paper consists of **TWO** Sections, **Section A** and **Section B**.

6. Section A is further divided into **Two Parts, Part I** consisting of **30 Multiple Choice** questions and **Part II** consisting of **4 Short Answer** questions. You must **answer ALL of them**. Every correct answer for the questions in Part I shall be awarded ONE (1) mark each, while correct and complete answer to questions in Part II shall be awarded FIVE (5) marks each.

7. **Section B** contains TWO (2) Case Studies out of which you must **Attempt only ONE** (1). The Case Study carries 50 marks.

8. While answering the multiple choice questions, write only the letter of the correct answer chosen against the number, clearly and legibly. Any double writing or smudgy answers shall not be evaluated. Eg. Q1 – a; Q2 – d; Q3 – a; etc.

9. This paper contains NINE (9) printed pages in all, including the Instruction page.

SECTION A

PART I –MULTIPLE CHOICE

Choose the Correct Answer and write down the question number and the letter of the correct answer chosen against it in the Answer Sheet provided.

1. A mining operator with a valid mining license wants to develop bench cut on a gentle slope of a hill. The whole hill is a solid hard quartzite deposit. As per the Mines and Minerals Management Regulation 2002, the operator can develop the bench with a side slope not exceeding

   (a) 40^0 from horizontal
   (b) 45^0 from horizontal
   (c) 60^0 from horizontal
   (d) 65^0 from horizontal

2. If a talc deposit lying in phyllitic rock mass is to be operated by opencast mining method, what slope angle would you propose for abandoned mine benches?

   (a) 60^0
   (b) 55^0
   (c) 50^0
   (d) 45^0

3. For an opencast mine, the ultimate pit slope angle is usually designed to be 45^0. The basic reason for this is

   (a) Stability of the slope/pit.
   (b) To get maximum recovery of mineral.
   (c) Because a mining Act/Regulation/Rule says so.
   (d) None of the above.

4. Following four deposits lie in a similar topography and other geotechnical parameters. Which would you prefer for mining?

   (a) Host rock in dip slope.
   (b) Host rock dipping into the slope.
   (c) Host rock dipping slightly into the slope.
   (d) A vertical host rock.

5. Which of the following, by a geological definition, is not a rock?

   (a) Dolomite
   (b) Limestone
   (c) Granite
   (d) Marble

6. Ultimate pit slope angle of an open pit mine is defined as the angle between the horizontal and the line joining

   (a) Toe of the highest bench and the toe of the lowest bench.
   (b) Crest of the highest bench and the crest of the lowest bench.
   (c) Crest of the highest bench and the toe of the lowest bench.
   (d) Toe of the highest bench and the crest of the lowest bench.

7. Angle of stable pit slope for weathered igneous rock, metamorphic and igneous rock is in the range of

   (a) 25^0 to 35^0
   (b) 40^0 to 50^0
   (c) 50^0 to 60^0
   (d) 60^0 to 70^0

8. Among the four minerals below, which is the softest?

   (a) Feldspar
   (b) Quartz
   (c) Fluorite
   (d) Apatite

9. The number of entries and exits of a mine least depends on

   (a) Length of the mine in the strike direction.
   (b) The requirement of separate routes for mineral and overburden transport.
   (c) Distance of haul.
   (d) Dip angle of the host rock.

10. Which of the following is most suitable for making a box cut?

    (a) Back hoe
    (b) Bulldozer
    (c) Bucket-wheel-excavator
    (d) Dragline

11. Which of the following statement is correct?

    (a) Generally, the individual mine bench slope angle is steeper than overall slope angle.
    (b) Generally, the individual mine bench slope angle is gentler than the overall slope angle.
    (c) Generally, the individual mine bench slope angle is equal to the overall slope angle.
    (d) None of the above statement is correct.

12. Considering the talc mines under operation, currently, in the Southern Foothills of Bhutan, which of following parameters will you give the most weightage while designing a mining pit plan?

    (a) Behaviour of the deposit.
    (b) Size of the deposit.
    (c) Rainfall and drainage system.
    (d) Mines access road.

13. Stripping Ratio is defined as the ratio of

    (a) Volume of overburden removed to the tonnage of mineral extracted.
    (b) Volume of overburden removed to the volume of mineral extracted.
    (c) Tonnage of overburden removed to the volume of mineral extracted.
    (d) Tonnage of overburden removed to the tonnage of mineral extracted.

14. As per Article 4 of Mines and Minerals Management Act, 1995 an 'inspector' is defined as

    (a) A person authorised by the Head of Ministry (now MoEA) to exercise power conferred by the Act.
    (b) An officer appointed by the Head of the Division (now Department of Geology and Mines) to enter and inspect a mine for any purpose as specified in the Act.
    (c) An officer who has been formally been accorded permission by the Ministry to execute a mining lease agreement with the lessee.
    (d) None of the above.

15. As per Article 38 of Mines and Minerals Management Act, 1995 an accident resulting in loss of life or serious bodily injury to any person has taken place in connection with work directly or indirectly related to a mining lease, the lessee/mines manager or any other person that the lessee has placed in charge of the mine must, after immediately reporting to a relevant agency also forthwith inform the Head of the Division (now Department of Geology and Mines) and follow it up with a written report to the Head of Division documenting the facts of the incident as soon as possible after the occurrence of the accident. Which of the following agency does the mines manager immediately has to report the accident?

    (a) Nearest Royal Bhutan Police.
    (b) Secretary, Ministry of Economic Affairs.
    (c) Dzongkhag authorities.
    (d) Office of the Regional and Area Coordinator, Department of Geology and Mines.

16. Having signed a Lease Agreement for the operation of a mine between the Government and a Mining Applicant, which of the following, do you think, will not be an obligation of the lessee?

    (a) Carry out mining operations in accordance with the Mine Plan, Environment Management Plan and Mine Restoration Plan and schedules submitted by the lessee and approved by the Head of Division and in accordance with Act and the terms and conditions laid down in the mining lease agreement.

(b) Keep accurate financial records of all components of the mining operation in such form as may be prescribed.
(c) Recognize obligations that may continue to apply beyond surrender, suspension, termination or expiry of the lease.
(d) Construct, operate and maintain mines, works plans, roads, aerial ropeways, communication systems and other facilities necessary or convenient for carrying on the purpose of the lease, and upon obtaining necessary industrial license and approval from the Ministry for establishment of processing plants.

17. As per the Mines and Minerals Management Regulation 2002, the maximum permissible noise level on the site shall be

(a) 70 dBA for an 8 hour shift.
(b) 80 dBA for an 8 hour shift.
(c) 90 dBA for an 8 hour shift.
(d) 100 dBA for an 8 hour shift.

18. A mine is surveyed, demarcated and mapped on a scale of 1:2000. If the map is blown by 25%, what would be the new scale?

(a) 1:1500
(b) 1:1750
(c) 1:2250
(d) 1:2500

19. Which of the following is not an excavator?

(a) Back hoe
(b) Continuous miner
(c) Front-end-loader
(d) Dragline

20. A host rock is dipping in the direction $N30^0E$. In what direction would the rock strike, in whole circle system?

(a) 140^0 to 320^0
(b) 30^0 to 210^0
(c) 120^0 to 300^0
(d) 150^0 to 330^0

21. Which of the following is not an underground coal mining method?

(a) Board and pillar method.
(b) Stoping method.
(c) Longwall method.
(d) Horizon mining method.

22. ANFO is

(a) A primary explosive.
(b) A secondary explosive.
(c) A tertiary explosive.
(d) An initiating explosive.

23. In the event of a misfire, the following procedure shall be followed.

(a) The tamping may be sludged out with compressed air or water under presure and the hole may be reprimed and fired.
(b) When the misfire is due to a faulty cable, or is due to a faulty connection in case of electrical firing, the shot may be fired again after the defect has been rectified.
(c) After the relieving hole has been fired, a careful search shall be made for cartridges and detonators amongst the material brought down by the shot.
(d) The blaster cannot leave the mine unless the misfire has been detected and fired again.

24. As per Section 162 of Mines and Minerals Management Regulation 2002, the lessee shall take all measures necessary to ensure that the ambient air quality meets the following standards at the site boundary.

(a) Less than 400 $\mu g/m^3$ concentration of suspended particulate matter
(b) Less than 500 $\mu g/m^3$ concentration of suspended particulate matter
(c) Less than 600 $\mu g/m^3$ concentration of suspended particulate matter
(d) Less than 700 $\mu g/m^3$ concentration of suspended particulate matter.

25. Among the following four explosives which one is the most suitable for control blasting?

(a) PETN
(b) ANFO
(c) Acconex
(d) Power Gel

26. The design of a mining haul road should be such that with minimum cost it should have high load bearing capacity and tally the designed traffic load. The design of the haul road will depend on the following, except that

(a) It should offer efficient transporting operation of mineral, ore and overburden.
(b) The selection of the site of the haul road should be such that it enables minimum cost of transportation of mineral and overburden, and there are no weak ground or slope stability problems.
(c) It should not balance the linkage between the crushing plants, beneficiation plants, stockyards and waste dumps.
(d) It should be sufficiently wide to avoid traffic congestion. One-way traffic is the best proposition for any surface mining.

27. While demarcating a mine boundary, area that least needs to be looked into is

(a) Topography; gradient of the landscape.
(b) Overburden dumpsite.
(c) Length and stability of access road.
(d) Forest cover.

28. A typical cash flow equation for a mining project follows the following sequence.

(a) Gross revenue-operating expense-depreciation-income tax + depreciation –capital cost = cash flow
(b) Gross revenue –operating expense –capital cost +depreciation – income tax = cash flow
(c) Gross revenue – operating expense – capital cost – depreciation – income tax = cash flow
(d) Gross revenue – operating expense – capital cost + depreciation – income tax – depreciation = cash flow

29. If someone puts Nu. 1 in a saving account, today, at a bank paying 10% simple interest, at the end of year 2 the depositor would have

(a) Nu. 1.10
(b) Nu. 2.10
(c) Nu. 1.21
(d) Nu. 2.20

30. Which of the following is a correct mine leasing process?

(a) Receipt of application→Pre-feasibility study of the deposit→Topo-survey and geo-mapping→Public, Forest and Environment Clearance→Final Mine Feasibility Study report→Signing of lease agreement→Trade license→Work order
(b) Receipt of application→Pre-feasibility study of the deposit→Public and Forest clearance→Topo-survey and geo-mapping→ Final Mine Feasibility Study report→Environment Clearance→Signing of lease agreement→Trade license→Work order
(c) Receipt of application→ Public and Forest Clearance→ Pre-feasibility study of the deposit→Topo-survey and geo-mapping→ Final Mine Feasibility Study report→Environment Clearance→Signing of lease agreement→Trade license→Work order
(d) Receipt of application→Pre-feasibility study of the deposit→Public and Forest clearance→Topo-survey and geo-mapping→ Final Mine Feasibility Study report→Environment Clearance→Signing of lease agreement→Work order→Trade license

PART II – SHORT ANSWER TYPE

1 What do you understand by Corporate Social Responsibility? How can it be addressed in a mine?

2 Provide a brief write-up on how the minerals can be allocated equitably.

3 A mine machinery has volumetric carrier capacity of 250 cft. If there is a void loss of 20% and the specific gravity of a rock is 2.5, what is the weight of the rock carried by the machine, when it is fully loaded?

4 Briefly explain the positive and negative impacts of mining in Bhutan. Also explain if these negative impacts can be addressed and how.

SECTION B – CASE STUDY

[Answer only One (1) Question]

1. Public clearance has been a big issue both to the Government and the mining companies. A mine which was leased, after having obtained the public clearance, is often closed due to the complaints put up by the same public. Having experienced the issues, number of times, it is being felt that guidelines for public consultation are necessary. Therefore, prepare a draft guidelines, which may serve the purpose.

2. A mining company is planning to operate a limestone mine in a hilly terrain near Thimphu. The company has given you a task of carrying out a detail environmental impact assessment of the proposed mine. Describe in detail, how you would carry out the study? You can put your own assumptions, if necessary.