Total Pages : 32

22 - I

22

Optional Paper

Mining Engineering

Paper – I

Time : 3 Hours | Maximum Marks : 200

IMPORTANT NOTES / महत्वपूर्ण निर्देश

(A) Please fill up the OMR Sheet of this Question Answer Booklet properly before answering. Please also see the directions printed on the obverse before filling it.
प्रश्नोत्तर पुस्तिका में प्रश्न हल करने से पूर्व उसके संलग्न ओ.एम.आर. पत्रक को भली प्रकार भर लें । उसे भरने हेतु उसके पृष्ठ भाग पर मुद्रित निर्देशों का अध्ययन कर लें ।

(B) The question paper has been divided into three Parts - **A, B** and **C**. The number of questions to be attempted and their marks are indicated in each part.
प्रश्न–पत्र अ, ब और स तीन भागों में विभाजित है । प्रत्येक भाग में से किये जाने वाले प्रश्नों की संख्या और उनके अंक उस भाग में अंकित किये गये हैं ।

(C) Attempt answers in **English**.
उत्तर अंग्रेजी भाषा में दीजिये ।

(D) Answers to all the questions of each part should be written continuously in the script and should not be mixed with those of other parts. In the event of candidate writing answers to a question in a part different to the one to which the question belongs, the question will not be assessed by the examiner.
उत्तर पुस्तिका में प्रत्येक भाग के समस्त प्रश्नों के उत्तर क्रमवार देने चाहिये तथा एक भाग में दूसरे भाग के उत्तर नहीं मिलाने चाहिये । एक भाग में दूसरे भाग के प्रश्न के उत्तर लिखे जाने पर ऐसे प्रश्न को जाँचा नहीं जा सकता हैं ।

(E) The candidates should not write the answers beyond the limit of words prescribed in parts **A, B** and **C** failing this the marks can be deducted.
अभ्यर्थियों को भाग अ, ब और स में अपने उत्तर निर्धारित शब्दों की सीमा से अधिक नहीं लिखने चाहिये। इसका उल्लंघन करने पर अंक काटे जा सकते हैं ।

(F) **In case the candidate makes any identification mark i.e. Roll No./Name/Telephone No./Mobile No. or any other marking either outside or inside the answer book, it would be treated as resorting to using unfair means. In such a case his candidature shall be rejected for the entire examination by the Commission.**
अभ्यर्थी द्वारा उत्तर पुस्तिका के अंदर अथवा बाहर पहचान चिन्ह यथा – रोल नम्बर / नाम / मोबाईल नम्बर / टेलीफोन नम्बर लिखे जाने या अन्य कोई निशान इत्यादि अंकित किये जाने को अनुचित साधन मान जायेगा। आयोग द्वारा ऐसा पाये जाने पर अभ्यर्थी की सम्पूर्ण परीक्षा में अभ्यर्थिता रद्द कर दी जायेगी ।

SEAL मुद्रा

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PART – A

Marks : 40

Note : Attempt all the **twenty** questions. Each question carries **2** marks. Answer should not exceed **15** words.

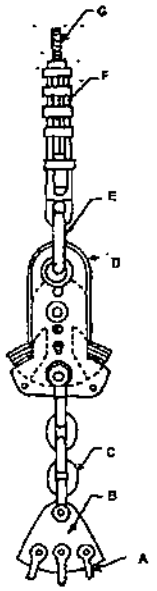
1 In case of a coal deposit how will you define break even stripping ratio?

2 Why the ventilation of retreating face is better than the advancing face in longwall method of underground coal mining?

3 What are the main combinations of face machinery used in mechanised board and pillar system of underground coal mining ?

4 What machine is used in Indian underground coal mines in conventional method depillaring?

5 Figure below shows the components of a cage suspension gear. Name the components.



6 What do you mean by "Flame Proof Enclosure" for electric motors used in underground coal mines?

7 What is the purpose of a Kep in a shaft?

8 What do you mean by the term "decoupling" used in blasting?

9 What is the purpose of the "Pull Down Mechanism" in a rotary blast hole drill?

10 What are the three braking systems provided in the off highway trucks used in the surface mines?

11 What are the main types of rock slope failure?

12 What is a primer used in blasting practice?

13 What do you mean by velocity of Detonation (VOD)?

14 Amongst Lang's lay and ordinary lay ropes, which has a tendency to unwind and why?

15 What is source of methane in coal beds?

16 What gradient is considered suitable for locomotive?

17 How the angle of wrap is increased in a belt conveyor?

18 Under what situation layered dumping is practiced to form spoil dumps?

19 On the basis of the supports how can you classify different underground mining methods.

20 Draw a schematic diagram showing the slope design parameters for an opencast mine.

PART – B

Marks : 60

Note : Attempt all the **twelve** questions. Each question carries **5** marks. Answer should not exceed **50** words.

21 Considering the immediate roof of an underground coal mine is friable and the adjusted RMR of the roof rock is 50, determine the expected load on the supports of the gallery if the density of the rock mass is 2.2 t/m^3 and the width of the gallery is 4.2 m.

22 What are the prerequisities for a successful in situ stress measurement using flatjacks ?

23 In a blasting with ANFO in surface mines it is observed that the blast has resulted in cracks on walls leading to its instability. What will you suggest to overcome this problem ?

24 What is pre-splitting and why is it practiced ?

25 If the applied load on a locked coil hoist rope of 40 mm diameter is 25 kN and rope length is 150 m. The modulus of elasticity of the rope is 98.1 kN/mm^2. Determine the elastic stretch of the rope.

26 A conveyor belt delivers crushed ore at 400 t/h over a horizontal distance of 3km. The drive head is 70% efficient and the input power is established as 425 kW from a motor rated at 500 kW. It is intended to re-install the conveyor along a path of gradient 1:10. If the drive head efficiency remains same determine the maximum distance the conveyor will operate.

27 What safety features are incorporated in the SDLs used in underground coal mining?

28 Why the grouted type of rock bolts find application in almost all types of rock?

29 Mention the essential properties of conveyor belt to be used for transportation of bulk materials in mines.

30 What is placer mining? Name the methods of placer mining.

31 For a 1500 RPM pump, find the impeller diameter necessary to develop a head of 50 m.

32 Name the types of continuous surface miners presently available in the market and mention their manufacturers.

PART – C

Marks : 100

Note : Attempt any **5** questions. Each question carries **20** marks. Answer should not exceed **200** words.

33 A bidirectional shearer is deployed in a longwall face of 120 m face length. The following information are pertaining to this installation :

(i) Average travelling speed of shearer loader from tail gate (TG) to main gate (MG) as well as from (TG) to (MG) : 3 m/min
(ii) Depth of web : 0.6 m
(iii) Seam thickness : 4.0 m
(iv) Swell factor of the coal : 1.2
(v) Average machine running time per shift : 5 hrs
(vi) Speed of the AFC : 1.4 m/sec
(vii) Density of coal : 1.1 te/m^3

Determine the following :

(a) Number of winning cycles per shift
(b) Coal produced per shift
(c) Maximum loading rate on the gate belt conveyor.

34 Enumerate the requirements that must be fulfilled while using diesel engines in under gound mining operations.

35 What are the main operations involved in dimensional stone mining? Describe how preparation and separation of blocks are carried out in such operations.

36 What is a rock bursts? How rock bursts are classified? Why rapid mining can lead to rock burst?

37 (a) Draw a schematic layout (plan and cross sectional view) of a surface coal mine being worked by deploying dragline for overburden removal.

(b) Also draw a cross sectional view of a dragline bench working with extended bench method.

38 Enumerate the items that must be inspected to ensure safe operations of powered roof supports in a longwall operation.

39 Compare different types of rope haulage systems used in underground coal mines.

SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह

SPACE FOR ROUGH WORK / रफ कार्य के लिए जगह

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SEAL