

Asstt. Mining Eng. & Geologist (Mines & Geology Dept)

पुस्तिका में पृष्ठों की संख्या : 24
Number of Pages in Booklet : 24
पुस्तिका में प्रश्नों की संख्या : 150
No. of Questions in Booklet : 150

DMG-25

प्रश्न-पुस्तिका संख्या व बारकोड/
Question Booklet No. & Barcode

822445

Paper Code : 70

Sub : Mining Engineering

समय : 02:30 घण्टे + 10 मिनट अतिरिक्त*

Time : 02:30 Hours + 10 Minutes Extra*

अधिकतम अंक : 150

Maximum Marks : 150

प्रश्न-पुस्तिका के पेपर की सील/पॉलिथीन बैग को खोलने पर प्रश्न-पत्र हल करने से पूर्व परीक्षार्थी यह सुनिश्चित कर लें कि :

- प्रश्न-पुस्तिका संख्या तथा ओ.एम.आर. उत्तर-पत्रक पर अंकित बारकोड संख्या समान हैं।
- प्रश्न-पुस्तिका एवं ओ.एम.आर. उत्तर-पत्रक के सभी पृष्ठ व सभी प्रश्न सही मुद्रित हैं। समस्त प्रश्न, जैसा कि ऊपर वर्णित है, उपलब्ध हैं तथा कोई भी पृष्ठ कम नहीं है/ मुद्रण त्रुटि नहीं है। किसी भी प्रकार की विसंगति या दोषपूर्ण होने पर परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें। यह सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी। परीक्षा प्रारम्भ होने के 5 मिनट पश्चात् ऐसे किसी दावे/आपत्ति पर कोई विचार नहीं किया जायेगा।

On opening the paper seal/polythene bag of the Question Booklet before attempting the question paper, the candidate should ensure that :

- Question Booklet Number and Barcode Number of OMR Answer Sheet are same.
- All pages & Questions of Question Booklet and OMR Answer Sheet are properly printed. All questions as mentioned above are available and no page is missing/misprinted.

If there is any discrepancy/defect, candidate must obtain another Question Booklet from Invigilator. Candidate himself shall be responsible for ensuring this. No claim/objection in this regard will be entertained after five minutes of start of examination.

परीक्षार्थियों के लिए निर्देश

1. प्रत्येक प्रश्न के लिये एक विकल्प भरना अनिवार्य है।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का मात्र एक ही उत्तर दीजिए। एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
4. OMR उत्तर-पत्रक इस प्रश्न-पुस्तिका के अन्दर रखा है। जब आपको प्रश्न-पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल नीले बॉल पॉइंट पेन से विवरण भरें।
5. कृपया अपना रोल नम्बर ओ.एम.आर. उत्तर-पत्रक पर सावधानीपूर्वक सही भरें। गलत रोल नम्बर भरने पर परीक्षार्थी स्वयं उत्तरदायी होगा।
6. ओ.एम.आर. उत्तर-पत्रक में करेक्शन पेन/व्हाइटनर/सफेदा का उपयोग निषिद्ध है।
7. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है।
8. प्रत्येक प्रश्न के पाँच विकल्प दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4, 5 अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले (बबल) को उत्तर-पत्रक पर नीले बॉल पॉइंट पेन से गहरा करना है।
9. यदि आप प्रश्न का उत्तर नहीं देना चाहते हैं तो उत्तर-पत्रक में पाँचवें (5) विकल्प को गहरा करें। यदि पाँच में से कोई भी गोला गहरा नहीं किया जाता है, तो ऐसे प्रश्न के लिये प्रश्न अंक का 1/3 भाग काटा जायेगा।
- 10.* प्रश्न-पत्र हल करने के उपरांत अभ्यर्थी अनिवार्य रूप से ओ.एम.आर. उत्तर-पत्रक जाँच लें कि समस्त प्रश्नों के लिये एक विकल्प (गोला) भर दिया गया है। इसके लिये ही निर्धारित समय से 10 मिनट का अतिरिक्त समय दिया गया है।
11. यदि अभ्यर्थी 10% से अधिक प्रश्नों में पाँच विकल्पों में से कोई भी विकल्प अंकित नहीं करता है तो उसको अयोग्य माना जायेगा।
12. मोबाइल फोन अथवा अन्य किसी इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज करते हुए राजस्थान सार्वजनिक परीक्षा (भर्ती) में अनुचित साधनों की रोकथाम अध्यापय) अधिनियम, 2022 तथा अन्य प्रभावी कानून एवं आयोग के नियमों-प्रावधानों के तहत कार्यवाही की जाएगी। साथ ही आयोग ऐसे अभ्यर्थी को भविष्य में होने वाली आयोग की समस्त परीक्षाओं से विवर्जित कर सकता है।

INSTRUCTIONS FOR CANDIDATES

1. It is mandatory to fill one option for each question.
2. All questions carry equal marks.
3. Only one answer is to be given for each question. If more than one answers are marked, it would be treated as wrong answer.
4. The OMR Answer Sheet is inside this Question Booklet. When you are directed to open the Question Booklet, take out the Answer Sheet and fill in the particulars carefully with Blue Ball Point Pen only.
5. Please correctly fill your Roll Number in OMR Answer Sheet. Candidates will themselves be responsible for filling wrong Roll No.
6. Use of Correction Pen/Whitener in the OMR Answer Sheet is strictly forbidden.
7. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. A wrong answer means an incorrect answer or more than one answers for any question.
8. Each question has five options marked as 1, 2, 3, 4, 5. You have to darken only one circle (bubble) indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
9. If you are not attempting a question then you have to darken the circle '5'. If none of the five circles is darkened, one third (1/3) part of the marks of question shall be deducted.
- 10.* After solving question paper, candidate must ascertain that he/she has darkened one of the circles (bubbles) for each of the questions. Extra time of 10 minutes beyond scheduled time, is provided for this.
11. A candidate who has not darkened any of the five circles in more than 10% questions shall be disqualified.
12. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt with as per rules.

Warning : If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would be liable to be prosecuted under Rajasthan Public Examination (Measures for Prevention of Unfair means in Recruitment) Act, 2022 & any other laws applicable and Commission's Rules-Regulations. Commission may also debar him/her permanently from all future examinations.

उत्तर-पत्रक में दो प्रतिथियाँ हैं - मूल प्रति और कार्बन प्रति। परीक्षा समाप्ति पर परीक्षा कक्ष छोड़ने से पूर्व परीक्षार्थी उत्तर-पत्रक की दोनों प्रतिथियाँ वीक्षक को सौंपेंगे, परीक्षार्थी स्वयं कार्बन प्रति अलग नहीं करें। वीक्षक उत्तर-पत्रक की मूल प्रति को अपने पास जमा कर, कार्बन प्रति को मूल प्रति से कट लाइन से मोड़ कर सावधानीपूर्वक अलग कर परीक्षार्थी को सौंपेंगे, जिसे परीक्षार्थी अपने साथ ले जायेंगे। परीक्षार्थी को उत्तर-पत्रक की कार्बन प्रति चयन प्रक्रिया पूर्ण होने तक सुरक्षित रखनी होगी एवं आयोग द्वारा मंगे जाने पर प्रस्तुत करनी होगी।

1. Determine the relief displacement, given a radial distance of 45 m, a height from the mean sea level of 2 m and a station height of 76 m.
- (1) 1.18 m (2) 1.81 m
(3) 9.18 m (4) 10.18 m
(5) Question not attempted
2. Which region of electromagnetic spectrum is primarily responsible for detecting the reflected energy peak of earth at approx $0.5 \mu\text{m}$?
- (1) Ultraviolet (2) Visible
(3) Infrared (4) Radar
(5) Question not attempted
3. Which of the following can describe the main purpose of the satellite station ?
- (1) It acts as false station.
(2) It acts as true station.
(3) It is the measuring length.
(4) It is the measuring diameter.
(5) Question not attempted
4. Under which regulation does the DGMS grant exemption for using delay detonators in solid blasting in mines ?
- (1) Reg 168 (2) Reg 175
(3) Reg 173 (4) Reg 160
(5) Question not attempted
5. Which of the following does not fall into the purview of remote sensing ?
- (1) Photogrammetry
(2) Aerial surveying
(3) Satellites surveying
(4) Photogrammetry and aerial surveying
(5) Question not attempted
6. The most widely used cut for drivage of galleries in coal seam is
- (1) Burn cut
(2) Pyramid cut
(3) Wedge cut
(4) Coromant cut
(5) Question not attempted
7. While charging, the explosive cartridge pricked with detonator is known as
- (1) Special gelatin cartridge
(2) Booster cartridge
(3) Primer cartridge
(4) Pricked cartridge
(5) Question not attempted
8. A cumulative error in surveying occurs in
- (1) same direction
(2) orthogonal directions
(3) either directions
(4) opposite directions
(5) Question not attempted

9. Permanent adjustment of theodolites does not include
- (1) Vertical axis adjustment
 - (2) Line of collimation adjustment
 - (3) Levelling the instrument
 - (4) Azimuthal level adjustment
 - (5) Question not attempted
10. Remote sensing by satellite began in
- (1) 1955 (2) 1960
 - (3) 1970 (4) 1985
 - (5) Question not attempted
11. The term EDM in surveying stands for
- (1) Electronic Distance Measurement
 - (2) Electromagnetic Distance Measurement
 - (3) Electrostatic Distance Measurement
 - (4) Electrical Distance Measurement
 - (5) Question not attempted
12. Indirect ranging is done when both the ends of a survey line are
- (1) non-aligned
 - (2) intervisible
 - (3) not intervisible
 - (4) above the ground level
 - (5) Question not attempted
13. In evaluating rock slope stability, which factor most significantly reduces the factor of safety against sliding ?
- (1) An increase in the friction angle of discontinuities
 - (2) The presence of water reducing effective normal stress along discontinuities
 - (3) Higher intact rock strength
 - (4) Enhanced slope reinforcement techniques
 - (5) Question not attempted
14. Which of the following instruments is most commonly used to monitor in-situ deformation (convergence) in underground excavations for ground control purposes ?
- (1) Piezometer
 - (2) Extensometer
 - (3) Inclinator
 - (4) Geophone
 - (5) Question not attempted
15. The load at which an axially loaded timber prop reaches its elastic limit is known as
- (1) Setting load
 - (2) Tear load
 - (3) Load bearing capacity
 - (4) Plastic load
 - (5) Question not attempted

16. Which rock mass classification system is primarily based on a visual evaluation of the rock mass structure and the condition of discontinuity of surfaces ?
- (1) Rock Mass Rating (RMR) system
 - (2) Q-system
 - (3) Geological Strength Index (GSI)
 - (4) Rock Quality Designation (RQD)
 - (5) Question not attempted
17. Which failure theory is most applicable to predict tensile fracture initiation in brittle rocks ?
- (1) Mohr-Coulomb criterion
 - (2) Griffith's criterion
 - (3) Hoek-Brown criterion
 - (4) Drucker-Prager criterion
 - (5) Question not attempted
18. Which microstructural characteristic most strongly influences the elastic (Young's) modulus of a rock ?
- (1) The average grain size distribution.
 - (2) The degree of bonding at grain boundaries.
 - (3) The overall porosity measured by RQD.
 - (4) The frequency of visible microfractures.
 - (5) Question not attempted
19. Typical values of Poisson's Ratio for marble ranges between
- (1) 0.15 – 0.3 (2) 0.20 – 0.25
 - (3) 0.20 – 0.35 (4) 0.20 – 0.40
 - (5) Question not attempted
20. Which of the following parameters is not considered in the Geomechanics classification system originally proposed by Bieniawski ?
- (1) Strength of Intact rock
 - (2) RQD
 - (3) Block size
 - (4) Condition of discontinuities
 - (5) Question not attempted
21. In a wide opening, such as, longwalling, the transverse pressure arch has its abutment on
- (1) Solid coal ahead of the face
 - (2) Packed goaf behind the face
 - (3) Solid coal beyond the gate roads
 - (4) Above the goaf area
 - (5) Question not attempted
22. The term RQD/Jn expressed in Q system refers to
- (1) Sizes of joint rock.
 - (2) Shear strength of block surfaces.
 - (3) Environmental conditions influencing the behaviour of the rock mass.
 - (4) Roughness of joint surfaces.
 - (5) Question not attempted

23. Which of the following are in the correct increasing order of core diameter ?

- (1) $EX < AX < BX < NX$
- (2) $AX < BX < EX < NX$
- (3) $NX < BX < AX < EX$
- (4) $AX < BX < NX < EX$
- (5) Question not attempted

24. In a borehole log of 1.2 m in length, recovery of rock core in cm is given below :

17, 8, 5, 18, 8, 4, 3, 9, 10, 11, 5, 10.

The RQD in percentage is

- (1) 90.0 (2) 31.8
- (3) 55.8 (4) 55.0
- (5) Question not attempted

25. Steel arches are used for support of

- (1) Goaf
- (2) Shaft
- (3) Permanent and semi-permanent roadways
- (4) Slot
- (5) Question not attempted

26. The value of Poisson's ratio for common rocks varies in a range of _____.

- (1) 0 – 1.0 (2) 0 – 0.5
- (3) 2 – 5 (4) 0.25 – 0.75
- (5) Question not attempted

27. In rock mass classification system, the maximum score assigned for RQD is

- (1) 15 (2) 20
- (3) 30 (4) 35
- (5) Question not attempted

28. In rock slope stability analysis, task of the engineer is to determine

- (1) Type of slope failure
- (2) Strength of rock
- (3) Factor of safety of slope
- (4) Integrity of rockmass
- (5) Question not attempted

29. Hydraulic steel props are

- (1) Rigid props
- (2) Yielding props
- (3) Friction props
- (4) Ultimate bearing stress props
- (5) Question not attempted

30. The working zone of stress prone seam can be relaxed by winning a relaxing seam

- (1) 30 – 50 m above (or 70 – 100 m below) the prone seam
- (2) 10 – 20 m above and below the prone seam
- (3) 50 – 70 m above (or 50 – 70 m below) the prone seam
- (4) which is contiguous
- (5) Question not attempted

31. For moderately ductile rocks, the axial strain (%) varies from

- (1) 2 – 5 (2) 4 – 8
- (3) 5 – 10 (4) 10 – 50
- (5) Question not attempted

32. Conventional chock type powered supports are available for seam heights of
- (1) 2 m (2) 2.5 m
 - (3) 3.04 m (4) 3.84 m
 - (5) Question not attempted
33. The quarriable limit for mechanical quarrying with dragline is
- (1) 1.5 : 1
 - (2) 2 : 1
 - (3) 4 : 1
 - (4) 8 : 1
 - (5) Question not attempted
34. Which type of surface has the highest pull per 1000 kgf of gross weight in the following options ?
- (1) Earth road
 - (2) Unploughed earth
 - (3) Loose sand and gravel construction in haul road
 - (4) Good macadam
 - (5) Question not attempted
35. The limit upto which subsidence takes place is indicated by
- (1) Rake angle
 - (2) Angle of yaw
 - (3) Contouring angle
 - (4) Angle of draw
 - (5) Question not attempted
36. Which of the rock drilling machine is also called sinker ?
- (1) Jack Hammer
 - (2) Drifter
 - (3) Wagon drill
 - (4) Stoper
 - (5) Question not attempted
37. Which of the following is not a manually operated system in longwall mining ?
- (1) Power system
 - (2) Staggered bar system
 - (3) Slide bar support
 - (4) Goal post system
 - (5) Question not attempted
38. Shortwall mining cannot be related to
- (1) Longwall method
 - (2) Bord and pillar method
 - (3) Surface mining method
 - (4) Horizon mining
 - (5) Question not attempted
39. Which of the following equipments is not required for seismic analysis ?
- (1) Geophone
 - (2) Refractor seismograph
 - (3) Sledge hammer
 - (4) Scraper
 - (5) Question not attempted

40. Which is not a part of rider used during shaft sinking ?
- (1) Safety hook
 - (2) Rider cone
 - (3) Walling scaffold
 - (4) Clivy
 - (5) Question not attempted
41. A dragline is capable of dealing with how many (million) m^3 working for 12-14 hours with bucket size $4.5 - 7.5 m^3$?
- (1) 0.25 - 0.75 (2) 1.5 - 1.7
 - (3) 3 - 4.5 (4) 4.5 - 7
 - (5) Question not attempted
42. The type of brakes that are not commonly used for mine machinery
- (1) Block brakes (2) Band brakes
 - (3) Line brakes (4) Disc brakes
 - (5) Question not attempted
43. Which of the following statements about mechanized longwall mining powered support is incorrect ?
- A. Better roof support
 - B. Less productivity
 - C. Moderate speed of advance
 - D. Considerably saving in manpower
- (1) A & B (2) B & C
 - (3) C & D (4) D & B
 - (5) Question not attempted
44. Which of the following are rotary compressor ?
- A. Rotary vane type
 - B. Rotary screw type
 - C. Centrifugal compressor
 - D. Rotary twin lobe compressor
- (1) A & B (2) B & C
 - (3) A, B, C & D (4) A, B & D
 - (5) Question not attempted
45. Which of the following does not belong to chief kinds of ferrous metal ?
- (1) Cast iron
 - (2) Wrought iron
 - (3) Steel
 - (4) Copper
 - (5) Question not attempted
46. Power is not transmitted mechanically by means of
- (1) Toothed gearing
 - (2) Rope
 - (3) Chain
 - (4) Conveyor
 - (5) Question not attempted
47. Which of the following is not a part of liquid controller for speed control on AC winder ?
- (1) Movable electrode
 - (2) Slip ring
 - (3) Isolator
 - (4) Exciter
 - (5) Question not attempted

48. Horizontal ledges situated on non-productive side of a surface mine for transportation and safety are known as

- (1) Trench
- (2) Box cut
- (3) Berm
- (4) Bench crest
- (5) Question not attempted

49. The size range of rotary drilled blast holes is from

- (1) 10 – 150 mm
- (2) 102 – 150 mm
- (3) 102 – 300 mm
- (4) 102 – 381 mm
- (5) Question not attempted

50. The milling drum in surface mines is located in

- (1) Front portion of the mines
- (2) Rear portion of the mines
- (3) Central portion of the mines
- (4) Front and central portion of the mines
- (5) Question not attempted

51. Strip mining is a method of

- (1) Room & Pillar mining
- (2) Open cast mining with a high degree of mechanisation
- (3) Horizon mining
- (4) Longwall mining
- (5) Question not attempted

52. In sublevel caving, the ore between the sub-levels is broken

- (1) Overhand
- (2) Underhand
- (3) Lateral direction
- (4) Both over and underhand
- (5) Question not attempted

53. The ratio of pulley diameters for 2 pulleys of one belt or rope drive should not normally exceed

- (1) 4 : 1 (2) 5 : 1
- (3) 6 : 1 (4) 8 : 1
- (5) Question not attempted

54. The most common drills used for drilling holes in underground coal mine drivages are

- (1) Electrically operated and rotary type
- (2) Pneumatically operated and rotary type
- (3) Electrically operated and percussive type
- (4) Battery operated and rotary type
- (5) Question not attempted

55. In Bord and Pillar mining, the percentage of extraction during the development ranges from

- (1) 10 – 15%
- (2) 10 – 20%
- (3) 14.8 – 43.7%
- (4) 15.7 – 45%
- (5) Question not attempted

56. Which of the following is not used for continuous coal mining from underground mines ?

- (1) Conveyer (2) Borer
- (3) Shuttle Car (4) SDL
- (5) Question not attempted

57. Salamon and Munro have designed a Nomograph for

- (1) Design of barrier pillars
- (2) Design of production pillars
- (3) Design of rib pillars
- (4) Design of shaft protection pillars
- (5) Question not attempted

58. The thermal diffusivity of a rock is given by the relation :

- (1) $(\text{Thermal conductivity of rock} \times \text{density of rock}) / \text{specific heat of rock}$
- (2) $(\text{Thermal conductivity of rock}) / (\text{specific heat of rock} \times \text{density of the rock})$
- (3) The amount of heat flow per unit area per unit time.
- (4) $(\text{Specific heat of the rock} \times \text{Thermal conductivity of rock}) / \text{density of rock}$
- (5) Question not attempted

59. During pillar extraction in stowing districts, the maximum permissible roof exposure at one time is

- (1) $150 - 160 \text{ m}^2$ (2) $120 - 130 \text{ m}^2$
- (3) $200 - 210 \text{ m}^2$ (4) $90 - 100 \text{ m}^2$
- (5) Question not attempted

60. Match the List-I with List-II and select the correct answer for increasing natural ventilation :

List-I

List-II

- | | |
|------------------|---------------------------------------|
| A. Chimneys | P. Bottom of the upcast shafts |
| B. Furnaces | Q. Along the direction of air current |
| C. Water falling | R. Top of the upcast shafts |
| D. Surface winds | S. Suction effect |

Codes :

- | | A | B | C | D |
|-----|------------------------|---|---|---|
| (1) | P | Q | R | S |
| (2) | R | P | Q | S |
| (3) | Q | R | P | S |
| (4) | S | P | R | Q |
| (5) | Question not attempted | | | |

61. A district of a mine is ventilated by $30 \text{ m}^3/\text{sec}$ quantity of air and the water gauge across the district is 25 mm. If the quantity has to be reduced to $20 \text{ m}^3/\text{sec}$ by installing a regulator in the return district, what is the resistance of the regulator ?

- (1) $\frac{1}{36} \text{ Ku}$ (2) $\frac{1}{16} \text{ Ku}$
- (3) $\frac{20}{576} \text{ Ku}$ (4) $\sqrt{52} \text{ Ku}$
- (5) Question not attempted

62. Which is correct statement for Bidirectional ventilation system ?

- (1) Air flows uni-directionally.
- (2) Both the intake and return shafts are located at the two strike boundaries.
- (3) Both the intake and return shafts are located close by at the center of the property.
- (4) It is commonly adopted in metal mines working steep lodes.
- (5) Question not attempted

63. Which is wrong statement for mine gases ?

- (1) A typical composition of after damp consists of 30-50% residual air, 58-44% free nitrogen, 8-4% CO₂, 4-2% CO.
- (2) Black damp is usually heavier than air, but becomes lighter when the percentage of carbon dioxide in it falls below 5.25%.
- (3) In Indian coal mines, the carbon dioxide content of mine air is not allowed to exceed 0.5%.
- (4) In Indian mines, a tolerable concentration of nitrous fumes is taken as 0.005%.
- (5) Question not attempted

64. For the airflow to be laminar, the Reynolds number should be

- (1) ≤ 3000 (2) > 3000
- (3) ≤ 2000 (4) > 2000
- (5) Question not attempted

65. Match the dust sampling instruments and their principles of operations :

Instrument	Principles
A. Tydalloscoper dust sampler	P. Filtration
B. MRE 113 dust sampler	Q. Sedimentation
C. Konimeter dust sampler	R. Optical
D. Simslin dust sampler	S. Inertial precipitation

Codes :

- | | | | | |
|-----|------------------------|---|---|---|
| | A | B | C | D |
| (1) | P | R | Q | S |
| (2) | R | P | S | Q |
| (3) | R | P | S | R |
| (4) | Q | S | P | S |
| (5) | Question not attempted | | | |

66. It is given that :

Methane content in return air current (vol. %) = 1.5%

Return air current quantity (m³/min) = 100 m³/min.

Mined or saleable output (t/day) = 1000 t/day.

The ratio of max. concentration of methane on any day in a week to average concentration of methane in the week factor = 1.5.

What is the methane emission rate ?

- (1) 2.25 m³/t (2) 1.44 m³/t
- (3) 1.00 m³/t (4) 10 m³/t
- (5) Question not attempted

67. As per the Environment Protection Rules, 1986, in new coal mines annual average of Suspended Particulate Matter (SPM) concentration in ambient air shall not exceed _____ $\mu\text{g}/\text{m}^3$.

- (1) 160
- (2) 260
- (3) 360
- (4) 460
- (5) Question not attempted

68. The bulb of Kata Thermometer is filled with

- (1) Coloured Alcohol
- (2) Mercury
- (3) Coloured Water
- (4) Coloured Spirit
- (5) Question not attempted

69. Which body was setup in 1997 to deal with the representations, complaints and appeals made against granting environmental clearance by MoEF?

- (1) NCEPC
- (2) NEAA
- (3) FAC
- (4) EIC
- (5) Question not attempted

70. During ventilation survey, speed of air flow was measured as $8 \text{ m}^3/\text{min}$ by velocimeter and the area of 'x' section of the gallery was $3 \text{ m} \times 3 \text{ m}$. What quantity of air will be passing per minute?

- (1) $648 \text{ m}^3/\text{min}$
- (2) $24 \text{ m}^3/\text{min}$
- (3) $0.88 \text{ m}^3/\text{min}$
- (4) $72 \text{ m}^3/\text{min}$
- (5) Question not attempted

71. An inclined manometer at 30° of inclination of gauge tubes and specific gravity of used liquid be 0.8 recorded 50 mm of gauge reading. Its reduction to the vertical type of manometer will be _____ mm.

- (1) 40.0
- (2) 34.64
- (3) 23.09
- (4) 20.0
- (5) Question not attempted

72. If A is equivalent orifice (m^2), Q is quantity of air flowing in m^3/sec and P is pressure absorbed in kgf/m^2 or in mm of wg then which of the following expression is correct?

- (1) $A = \frac{0.385 Q}{P}$
- (2) $A = \frac{0.385 Q}{\sqrt{P}}$
- (3) $A = \frac{0.385 Q}{P^2}$
- (4) $A = \frac{0.385 Q}{P^3}$
- (5) Question not attempted

73. A ventilation fan is producing a head of 100 Pa with 1000 rpm speed. If the speed of ventilation fan is increased from 1000 rpm to 2000 rpm, the head developed will be

- (1) 25
- (2) 400
- (3) 700
- (4) 50
- (5) Question not attempted

74. A fan driven by a 3 phase AC induction motor delivers 5666 cubic meter per minute at 75 mm of wg. What will be air H.P. ?

- (1) 5892
- (2) 149.55
- (3) 98.2
- (4) 89.2
- (5) Question not attempted

75. In an area the rocks thermal conductivity of strata is $1.9 \text{ W/m}^\circ\text{C}$ and heat flow value of the region is 0.05 W/m^2 . The geothermic gradient of the area will be _____ m°C .

- (1) 38
- (2) 1.95
- (3) 1.85
- (4) 95
- (5) Question not attempted

76. Flammable limits of methane-air mixture lies between _____ to _____ gm/m^3 .

- (1) 53 to 100
- (2) 33 to 100
- (3) 63 to 100
- (4) 83 to 100
- (5) Question not attempted

77. Which of the following equipments is designed to protect against a maximum concentration of 1.5% CO ?

- (1) Proto Mark IV
- (2) Self Rescuer
- (3) Antiploys instrument
- (4) Novox apparatus
- (5) Question not attempted

78. Average candle power of a lamp in all directions in a horizontal plane passing through the centre of the source and is usually obtained by rotating the lamp about a vertical axis is called

- (1) Mean spherical candle power
- (2) Mean luminous flux
- (3) Mean candela
- (4) Mean horizontal candle power
- (5) Question not attempted

79. Which is not acceptable as per DGMS guideline for height and width of haul road ?

- (1) No road shall have gradient more than 1 in 16.
- (2) No road shall be of width less than three times plus, 5 m width of the largest vehicle playing on road.
- (3) All corners and bends shall be made in such a way that operator of vehicle have clear view of distance of not less than 3 times the breaking distance of largest HEMM working at 40 km/hr.
- (4) It shall be provided with strong parapet wall having dimensions of width at top not less than 0.5 m, width at bottom not less than 2 m and height more than diameter of tyre of largest vehicle plying on road.

(5) Question not attempted

80. A mining operation has an annual sales revenue of ₹ 15,00,000 from a silver ore. Operating costs are ₹ 7,00,000, the allowable depreciation is ₹ 1,00,000 and the applicable tax rate is 32%. The cost depletion basis is zero. What is taxable income before depletion ?

- (1) 7,00,000 (2) 1,00,000
- (3) 2,25,000 (4) 6,48,000
- (5) Question not attempted

81. Match the following :

Equipment

Action

- | | |
|---------------------|--|
| P. Hydraulic shovel | A. Rack forward the arm |
| Q. Dragline | B. Walking action |
| R. Surface miner | C. Wrist action |
| S. Power shovel | D. The rear crawlers travel at lower level than the front crawlers |

Codes :

- | | P | Q | R | S |
|-----|------------------------|---|---|---|
| (1) | B | D | C | A |
| (2) | C | B | D | A |
| (3) | C | A | B | D |
| (4) | A | B | C | D |
| (5) | Question not attempted | | | |

82. Which is not a suitable underground mining method when ore body is wide vein & dip is steep, ore wall is strong but the host rock wall is weak ?

- (1) Sublevel caving
- (2) Cut & fill stoping
- (3) Sublevel stoping
- (4) Square set stoping
- (5) Question not attempted

83. The underground and open cast mining cost are ₹ 5,000 per tonne and ₹ 800 per tonne, respectively. The stripping cost is ₹ 300 per m³. What is economic stripping ratio (m³/tonne) ?

- (1) 10 (2) 16
(3) 12 (4) 14
(5) Question not attempted

84. A dump slope is designed with bench width of 20 m, bench slope of 37.5 degree, and bank width of 15 m. The number of benches are five. Calculate the overall slope angle in degrees.

- (1) 15.20 (2) 12.10
(3) 20.37 (4) 16.50
(5) Question not attempted

85. An open-pit system is composed of shovel, dump truck, working face and dumping place, which form a series configuration. The reliabilities of the four components are 0.8, 0.9, 0.98 and 0.97 respectively. Calculate the open pit system reliability if all its components fail independently.

- (1) 1.2×10^{-5}
(2) 0.6844
(3) 0.7574
(4) 1.3203
(5) Question not attempted

86. Which of the following is used to determine frauds and innocent salting ?

- (1) Dummy samples
(2) Borehole logs
(3) Mineral analysis report
(4) Feasibility report
(5) Question not attempted

87. In a mine 10 core samples of different lengths were collected. The total length of the samples were 70 feet with overall foot-assay of 7700. What will be the average assay value ?

- (1) 770 (2) 7
(3) 1100 (4) 110
(5) Question not attempted

88. A mining company borrowed a loan of ₹ 25 million for a period of 15 years at a compound interest rate of 6%. How much company has to pay after 15 years ?

- (1) 95.91 million (2) 59.91 million
(3) 95.19 million (4) 59.19 million
(5) Question not attempted

89. In mine planning, kriging is used for estimation of ____.

- (1) Mine life
(2) Ultimate pit limit
(3) Cutoff grade
(4) Reserve estimation
(5) Question not attempted

90. A company invested ₹ 4 lakh in a machine with an expected useful life of 12 years. The net income expected from the operation of the machine is ₹ 80,000 per annum. The payback period of the machine is

- (1) 4 years (2) 5 years
- (3) 6 years (4) 4.5 years
- (5) Question not attempted

91. In PERT network, the activity duration is assumed to follow

- (1) Beta distribution
- (2) Binomial distribution
- (3) Normal distribution
- (4) Weibull distribution
- (5) Question not attempted

92. The relationship between Tonnage Factor (TF), Weight (W) and Volume (V) of mineral can be written as

- (1) $W = TF \times V$ (2) $V = TF \times W$
- (3) $TF = V \times W$ (4) $V = TF / W$
- (5) Question not attempted

93. A mining company has to pay an annuity of ₹ 25 lakhs per year for 20 years at 6% compound interest. What will be the present value ?

- (1) ₹ 275.86 lakh (2) ₹ 268.75 lakh
- (3) ₹ 286.75 lakh (4) ₹ 275.68 lakh
- (5) Question not attempted

94. The cash flow (in ₹ crore) for a small scale project is given below :

Periods (year)	Project cost (crore)
0	-200
1	100

Assuming 10% discount rate, the NPV of project is

- (1) 109.09
- (2) -110
- (3) -109.09
- (4) 200
- (5) Question not attempted

95. The term 'berm' is used to refer to the piles of rock material which is used to improve mine safety. The height of 'berm' is

- (1) Half of bench height
- (2) Half of radius of tire
- (3) Equal or greater than radius of tire
- (4) Half of bench width
- (5) Question not attempted

96. Internal Rate of Return (IRR) of project is the discount rate at which

- (1) Profit after tax is zero
- (2) Planning cost is zero
- (3) NPV of all cash flow is zero
- (4) None of these
- (5) Question not attempted

97. It is the cut used to provide a smooth entry into the pit and to facilitate the development of working benches. This cut is known as ____.

- (1) Blind cut (2) Box cut
(3) Parallel cut (4) Slot
(5) Question not attempted

98. Match List-I with List-II, as per the regulation 83 of Metalliferrous Mines Regulations, 1961 related to Code of Signals.

List-I

List-II

- | | |
|------------------------|-----------|
| A. Stop | 1. 1 Rap |
| B. Men ready to ascend | 2. 2 Raps |
| C. Lower | 3. 3 Raps |
| D. Raise | 4. 4 Raps |

Codes :

- | | A | B | C | D |
|-----|---|---|---|---|
| (1) | 1 | 2 | 4 | 3 |
| (2) | 1 | 4 | 2 | 3 |
| (3) | 1 | 4 | 3 | 2 |
| (4) | 1 | 3 | 4 | 2 |

(5) Question not attempted

99. The following data is given for a borehole :

Length (ft)	Grade (%)
2	0.590
5	0.480
2	0.330
3	0.750
2	0.250

Calculate the average grade.

- (1) 0.410 (2) 0.450
(3) 0.499 (4) 0.610
(5) Question not attempted

100. Which is wrong statement in regards to Safety Committee as per Mines Rules 1955 ?

- (1) For every mine wherein more than 100 persons employed the owner, agent or manager shall form this.
(2) The owner shall be the Chairman.
(3) The purpose of this Committee is to promote safety in mine.
(4) Safety officer shall act as Secretary of Committee.
(5) Question not attempted

101. Which form is used by the medical examining authority to report the person concerned as per Mines Rules 1955 ?

- (1) Form M (2) Form P-I
(3) Form O (4) Form N
(5) Question not attempted

102. What is the duration of medical examination of rescue trained person by qualified medical practitioner as per Mines Rescue Rules 1985 ?

- (1) Once at least in six months.
(2) Once at least in nine months.
(3) Once at least in twelve months.
(4) Once at least in twenty four months.
(5) Question not attempted

103. What is the permissible dust concentration in Indian coal mines ?

- (1) 3 mg/m³ of respirable dust
- (2) 2 mg/m³ of respirable dust
- (3) 5 mg/m³ of respirable dust
- (4) 10 mg/m³ of respirable dust
- (5) Question not attempted

104. Every shaft or winze in the course of being sunk, exceeds 20 m in depth and has an inclination more than 60 degrees from the horizontal, the sollers shall be provided at interval of :

- (1) not more than 15 m
- (2) not more than 10 m
- (3) not more than 25 m
- (4) not more than 30 m
- (5) Question not attempted

105. Which is not a correct definition as per MMR 1961 ?

- (1) "Railway" as defined in the Indian Railway Act 1884.
- (2) "Working place" any place in a mine to which any person has lawful access.
- (3) "Month" a Calendar month.
- (4) "Metalliferous mine" includes other than a coal or an oil mine.
- (5) Question not attempted

106. Mines Act 1952, extend to

- (1) The whole of India
- (2) The whole of India except Meghalaya
- (3) The whole of India except Jammu & Kashmir
- (4) The whole of India except Meghalaya and Jammu & Kashmir
- (5) Question not attempted

107. Which section of Mines Act 1952 was modified for allowing employment of women below ground ?

- (1) Section 83 (2) Section 46
- (3) Section 59 (4) Section 56
- (5) Question not attempted

108. Bye laws are drafted by Chief Inspector of Mines and approved by

- (1) Ministry of Mines
- (2) Chief Inspector of Mines
- (3) Ministry of Law
- (4) Central Government
- (5) Question not attempted

109. Every winding rope should be examined once at least in every 7 days at a speed not exceeding :

- (1) 0.5 metre per second
- (2) 1 metre per second
- (3) 1.5 metres per second
- (4) 2 metres per second
- (5) Question not attempted

110. According to M-sand Policy, minimum ____ % of total sand used in government construction.

- (1) 10
- (2) 15
- (3) 20
- (4) 25
- (5) Question not attempted

111. For the production of M-sand from the OB dumps under captive schemes, permits can be issued by ____ for ____ years.

- (1) Mining Engineer , 10
- (2) Mining Engineer , 30
- (3) SME , 10
- (4) SME , 30
- (5) Question not attempted

112. According to Rajasthan Minor Mineral Concession Rules, all Quarry licences are granted for a period of ____ years.

- (1) 40
- (2) 50
- (3) 30
- (4) 10
- (5) Question not attempted

113. Annual returns must be submitted on or before ____ in every year in Form III.

- (1) 31st March
- (2) 31st December
- (3) 20th January
- (4) 20th February
- (5) Question not attempted

114. What is the primary goal of the Rajasthan M-sand policy ?

- (1) To promote the use of river sand for construction.
- (2) To utilize manufactured sand as a substitute for river sand.
- (3) To increase the mining of natural sand in Rajasthan.
- (4) To regulate the price of river sand.
- (5) Question not attempted

115. The Ministry of Mines has notified that the rate of contribution to DMF will be ____.

- (1) 10% of royalty in respect of mining leases granted on or after 12.1.2015.
- (2) 10% of royalty in respect of mining leases granted prior to 12.1.2015.
- (3) 15% of royalty in respect of mining leases granted on or after 12.1.2015.
- (4) 15% of royalty in respect of mining leases granted before 12.1.2015.
- (5) Question not attempted

116. According to MMR-1961, a "Reserve Station" is used for

- (1) to house standby machinery below ground.
- (2) to keep container containing explosives below ground.
- (3) to provide space to workers for lunch/rest below ground.
- (4) to house deployment office below ground.
- (5) Question not attempted

117. As per MMR-1961, the notice of the mine opening, closing or change shall be given in _____.

- (1) Form II
- (2) Form I
- (3) Form III
- (4) Form IV
- (5) Question not attempted

118. According to MMR 1961 : No working shall be made within a distance of _____ of the boundary of any mine.

- (1) 7.5 m
- (2) 15.0 m
- (3) 22.5 m
- (4) 30.0 m
- (5) Question not attempted

119. In preparing plans and sections, symbol given below represents



- (1) Drift
- (2) Underground coal barrier
- (3) Boundary of lease hold
- (4) Explosion proof stopping
- (5) Question not attempted

120. It is a device that prevents the descending cage from being landed at the pit bottom at a speed exceeding 1.5 metres per second. The device is called

- (1) Automatic contrivance
- (2) Automatic brake
- (3) Safety hooks
- (4) Emergency brake
- (5) Question not attempted

121. The slope of spoil bank shall be determined by the natural angle of repose of the material being deposited but any case, shall not exceed 'A' degrees from the horizontal. What is 'A' ?

- (1) 45
- (2) 37.5
- (3) 25
- (4) 30
- (5) Question not attempted

122. As per MCDR 2017, the scale of key plan is ____.

- (1) 1:5000 (2) 1:1000
- (3) 1:50000 (4) 1:2000
- (5) Question not attempted

123. Application of prospecting licence must be filled in form

- (1) A (2) B
- (3) D (4) E
- (5) Question not attempted

124. As per MCR 1960, refusal to provide facilities for practical training of students by any owner, agent or manager of a mine should be referred to ____.

- (1) Controller General, Indian Bureau of Mines
- (2) DGMS
- (3) State Government
- (4) Department of Mining and Geology
- (5) Question not attempted

125. Which of the following types of containers is required for carrying explosives ?

- (1) Cast Iron
- (2) Copper
- (3) Aluminium
- (4) Hard galvanized Cr steel
- (5) Question not attempted

126. As per MMR-1961, the height of every main drive shall be ____.

- (1) not less than 2.4 Met
- (2) not less than 1.8 Met
- (3) not less than 2.1 Met
- (4) not less than 3.0 Met
- (5) Question not attempted

127. According to Mine Rules, every person employed in the mine should go for the periodic medical examination at intervals of ____.

- (1) not more than one year
- (2) not more than two years
- (3) not more than three years
- (4) not more than five years
- (5) Question not attempted

128. According to Circular no. 7 of 1997, permissible PPV (mm/s) for an industrial building (RCC) not belonging to owner with a frequency < 8 Hz, should be less than

- (1) 2
- (2) 5
- (3) 10
- (4) 15
- (5) Question not attempted

129. Which of the following is not an igneous rock ?

- (1) Granite (2) Syenite
- (3) Quartzite (4) Peridotite
- (5) Question not attempted

130. What is 'Laccolith' ?

- (1) Large igneous rock formally has a basin-like shape.
- (2) Large igneous rock mass of irregular outline widening downward.
- (3) Parallel vertical wall of igneous rock.
- (4) Large igneous rock formed from the cooling of magma, which caused the previous bed to arch in the form of a dome.
- (5) Question not attempted

131. What is 'Batholith' ?

- (1) Large igneous rock formally has a basin-like shape.
- (2) Large igneous rock mass of irregular outline widening downward.
- (3) Large igneous rock formed from the cooling of magma, which caused the previous bed to arch in the form of a dome.
- (4) Parallel vertical wall of igneous rock.
- (5) Question not attempted

132. In igneous rocks, what is meant by "Porphyritic texture" ?

- (1) A glassy matrix that often contains gas cavities.
- (2) Crystals that are invisible to the naked eyes.
- (3) Large crystals in a matrix, which is more finely crystalline or even glassy.
- (4) It's detailed soil geochemical sampling.
- (5) Question not attempted

133. What does the term "gangue" refer to in the context of ore deposits ?

- (1) The economically valuable mineral component.
- (2) The naturally occurring, non-economic material intermingled with the ore.
- (3) The zone of alteration surrounding the ore body.
- (4) The secondary minerals formed by oxidation of the ore.
- (5) Question not attempted

134. What is magmatic segregation ?

- (1) Minerals having nearly similar fusion points segregate and concentrate.
- (2) Minerals having entirely different fusion points segregate and concentrate.
- (3) Gauges having similar fusion points segregate and concentrate.
- (4) Gauges having entirely different fusion points segregate and concentrate.
- (5) Question not attempted

135. Which of the following is not a part of mineral exploration ?

- (1) Sampling
- (2) Reserve estimation
- (3) Valuation of ore deposit
- (4) Blending
- (5) Question not attempted

136. Eolian Deposits are deposited by

- (1) Wind (2) Rivers
- (3) Glaciers (4) Oceans
- (5) Question not attempted

137. Naturally occurring, inorganic crystalline elements or compounds are termed as

- (1) Rock
- (2) Ore
- (3) Mineral
- (4) Gangue
- (5) Question not attempted

138. According to the seismic zoning maps published by the Bureau of Indian Standards, which region is classified under India's highest seismic hazard (Zone V) ?

- (1) The Indo-Gangetic Plain
- (2) The Peninsular Shield
- (3) The Himalayan Frontal Thrust region
- (4) The Western Ghats
- (5) Question not attempted

139. Any naturally occurring aggregate of one or more types of minerals is termed as

- (1) Ore
- (2) Multi-metal
- (3) Rock
- (4) Gangue
- (5) Question not attempted

140. The mineral products obtained after processing need to undergo

- (1) Beneficiation
- (2) Dressing
- (3) Smelting
- (4) Cleaning
- (5) Question not attempted

141. Post mining activity that restores the mining sites is known as

- (1) Discharge monitoring
- (2) Conversion of waste to wealth
- (3) Demarcation of land
- (4) Reclamation
- (5) Question not attempted

142. Streak can be defined as

- (1) Glowing of various colours in minerals.
- (2) Way in which the mineral surface reflects.
- (3) Colour of a powdered mineral.
- (4) Amount of light that can pass through a mineral.
- (5) Question not attempted

143. A staple pit is defined as

- (1) A horizontal opening from one underground working place to another underground working place extended to the surface.
- (2) A vertical pit from one underground working place to another underground working place extended to the surface.
- (3) A vertical pit from one underground working place to another working place does not extend to surface.
- (4) A horizontal opening from one underground working place to another underground working place not extended to the surface.
- (5) Question not attempted

144. Which of the following is not a part of the pit top arrangement ?

- (1) Buffer
- (2) Brow
- (3) Tippler
- (4) Conveyors
- (5) Question not attempted

145. Slow earthquakes represent rock fault movement as

- (1) Steady rupture
- (2) Slow creep
- (3) Rupture and creep
- (4) Slow but uniform rupture
- (5) Question not attempted

146. Which of the following is not a fuel sensitiser ?

- (1) Calcium Nitrate
- (2) Urea
- (3) PETN
- (4) TNT
- (5) Question not attempted

147. Which of the following group of explosives are known as off-the-solid explosives ?

- (1) P1
- (2) P3
- (3) P4
- (4) P5
- (5) Question not attempted

148. The maximum permissible charge per shot hole (gms) for P1 explosives is

- (1) 800
- (2) 1000
- (3) 565
- (4) 890
- (5) Question not attempted

149. The maximum permissible charge per shot hole (gms) for P3 explosives is

- (1) 700
- (2) 800
- (3) 900
- (4) 1000
- (5) Question not attempted

150. Under CMR 66 and MMR 68, every mine should have at least how many shafts before any underground production work is undertaken ?

- (1) 1 shaft
- (2) 2 shafts
- (3) 4 shafts
- (4) 3 shafts
- (5) Question not attempted

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