

Mining, Mechanical & Drilling Engineering,

CBRT – 17th December 2017 (FN) 9.30-11.30 AM

1. Throttling curve in a centrifugal pump running at constant speed represents the relationship between:
 - (a) Power and flow rate
 - (b) Efficiency and flow rate
 - (c) Head and flow rate
 - (d) Efficiency and net suction positive head

2. Consider the following statements regarding the stability of bodies in a fluid medium:
 1. The stability of a submerged body requires that the centre of gravity lies below the centre of buoyancy
 2. To improve the stability of a floating body by increasing the bottom width and reducing the draft
 3. For stability of a floating body, the metacentre should be above the centre of buoyancy but below the centre of gravity

Which of the above statements are correct?

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 1 and 3 only
- (d) 2 and 3 only

3. How does the angle of attack effect lift and drag?
- (a) Increasing the angle of attack can decrease the lift, but it also increases drag so that less thrust required
 - (b) Increasing the angle of attack can increase the lift, but it also increases drag so that less thrust required
 - (c) Increasing the angle of attack can increase the lift, but it also increases drag so that more thrust required
 - (d) Increasing the angle of attack can decrease the lift, but it also increases drag so that more thrust required
4. A stone weighs 392.4 N in air and 196.2 N when fully submerged in water. The volume of the stone is:
- (a) $1 \times 10^4\text{ cm}^3$
 - (b) $2 \times 10^4\text{ cm}^3$
 - (c) $3 \times 10^4\text{ cm}^3$
 - (d) $4 \times 10^4\text{ cm}^3$
5. Diving equipment has been designed to withstand an absolute pressure of 5 standard atmosphere in water. The depth a driver can safely descend with this equipment, expressed in terms of atmospheric pressure and γ the specific density of the water is:
- (a) $\frac{2\text{ atm}}{\gamma}$
 - (b) $\frac{3\text{ atm}}{\gamma}$
 - (c) $\frac{4\text{ atm}}{\gamma}$
 - (d) $\frac{5\text{ atm}}{\gamma}$

6. A cylindrical body of diameter D , height H and specific gravity S_b is floating in a liquid of specific gravity S_l . The wetted height of the cylinder for stable equilibrium in the liquid is:

(a) $D \left(\frac{S_b}{S_l} \right)^{\frac{1}{2}}$

(b) $H \left(\frac{S_b}{S_l} \right)^{\frac{1}{3}}$

(c) $D \left(\frac{S_b}{S_l} \right)^{\frac{1}{3}}$

(d) $H \left(\frac{S_b}{S_l} \right)^{\frac{1}{2}}$

7. The parallel coupling of a Hookean Model and a Newtonian Model makes a Rheological Model of:

(a) Kelvin

(b) Burger

(c) Bingham

(d) Maxwell

8. The Froude number, F , is designed by $F = \frac{V}{\sqrt{gD}}$, where, g is gravitational acceleration, V is the one-dimensional mean velocity of flow and D is:

1. Depth of flow,
2. Hydraulic mean depth of channel geometry

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

9. Consider the following statements:

1. Viscous effects in the near-boundary flow can be neglected under large Reynolds numbers
2. Creeping flow is a Stokes flow when Reynolds number is less than 1

Which of the above statements is/are correct?

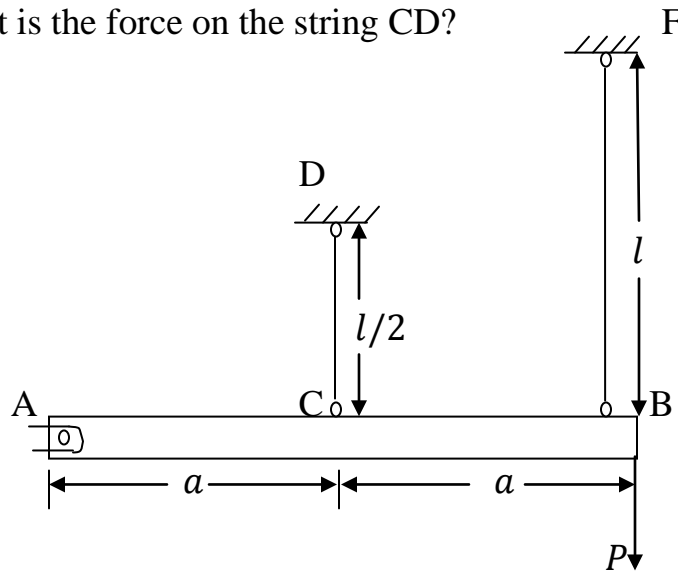
- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

10. For laminar flow through a pipe, the shear stress over the cross-section varies:
- (a) Inversely as the distance from the centre of the pipe
 - (b) Directly as the distance from the surface of the pipe
 - (c) Directly as the distance from the centre of the pipe
 - (d) Inversely as the distance from the surface of the pipe
11. A ladder is resting on a smooth ground and is leaning against a rough vertical wall. The frictional force will act:
- (a) Upwards at its upper end
 - (b) Towards the wall at its upper end
 - (c) Away from the wall at its upper end
 - (d) Downwards at its upper end
12. When a body is in equilibrium under the action of coplanar concurrent forces, the algebraic sum of:
- 1. All forces acting on the body is zero
 - 2. Moments of forces about any fixed point is non-zero
 - 3. Moments of forces about any fixed point is zero
 - 4. All forces acting on the body is non-zero
- Which of the above statements is/are correct?
- (a) 1 only
 - (b) 2 only
 - (c) 1 and 3 only
 - (d) 2 and 4 only

13. Creep of rock at the maximum expected pressure should be measured by keeping the pressure constant for:

- (a) 2-3 hours
- (b) 2-3 months
- (c) 2-3 minutes
- (d) 2-3 days

14. A rigid bar AB is held by two strings of steel of same area as shown in the figure. What is the force on the string CD?



- (a) P
- (b) $\frac{2P}{3}$
- (c) $\frac{P}{2}$
- (d) 0

15. A solid circular shaft of radius r and length l is fixed at one end and free at the other end. A torque T is applied at the free end. The shear modulus of the material is G . The angle of twist at the free end is:

(a) $\frac{8 T L}{\pi G r^4}$

(b) $\frac{4 T L}{\pi G r^4}$

(c) $\frac{2 T L}{\pi G r^4}$

(d) $\frac{T L}{\pi G r^4}$

16. An I section of depth 100 mm has an area of 1000 mm^2 . A plate of $100 \text{ mm} \times 5 \text{ mm}$ is then welded to the top flange of this beam. This composite section is used as a simply supported beam. What will be the ratio of the maximum tensile stress to the maximum compressive stresses on this composite section under pure bending of beam?

(a) 1.22

(b) 1.30

(c) 1.41

(d) 1.59

17. Shear centre refers to:

1. The point through which loading should pass such that there is only bending and no twisting
2. It is the point through which resultant shear stress passes

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Neither 1 nor 2
- (d) Both 1 and 2

18. In Bord and Pillar panels worked in conjunction with hydraulic stowing, line of extraction preferred is:

- (a) Steep diagonal
- (b) Step diagonal
- (c) Straight line
- (d) Diagonal

19. In a two-dimensional system, the maximum principal stress is tensile, being $\sigma_1 = 190 \text{ N/mm}^2$ and the minimum principal stress σ_2 is compressive. The yield stress, in simple tension and simple compression is $\sigma_y = 250 \text{ N/mm}^2$. Poisson's ratio $\mu = 0.25$. What is value of σ_2 for which the yielding would commence in the material?

- (a) 250 N/mm^2
- (b) 220.5 N/mm^2
- (c) 205 N/mm^2
- (d) 202.5 N/mm^2

20. Consider the following statements with reference to built-up-edge on a cutting tool while machining:

- 1. It increases the frictional resistance
- 2. It causes increased power consumption
- 3. It results in poor surface finish

Which of the above statements are correct?

- (a) 1, 2 and 3
- (b) 1 and 2 only
- (c) 1 and 3 only
- (d) 2 and 3 only

21. For the measurement of a fore bearing and back bearing of a traverse, the bearing of a line is defined as the angle made by the line with:
- (a) Full reference direction and measured in clockwise direction
 - (b) Zero reference direction and measured in clockwise direction
 - (c) Zero reference direction and measured in anticlockwise direction
 - (d) Full reference direction and measured in anticlockwise direction
22. The welding process in which molten metal flows into the mould, melts the parts, and forms the joint on solidifying, is known as:
- (a) Fusion welding
 - (b) Thermit welding
 - (c) Fission welding
 - (d) Gas welding
23. The maximum possible draft in a rolling operation depends on:
1. Coefficient of friction between roll and work
 2. Roll diameter

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

24. A dummy block is used between the ram and the metal in:

1. Direct extrusion
2. Indirect extrusion
3. Impact extrusion

Which of the above statements is/are correct?

- (a) 1, 2 and 3
- (b) 1 only
- (c) 2 only
- (d) 3 only

25. Which one of the following is the correct sequence of operation in production, planning and control?

- (a) Routing, scheduling, dispatching and follow-up
- (b) Scheduling, routing, dispatching and follow-up
- (c) Routing, dispatching, scheduling and follow-up
- (d) Scheduling, dispatching, routing and follow-up

26. Consider the following statements with reference to the process of design of 'Limit Gauges':

1. Wear allowance of 5 % of work tolerance is given to the 'Go' Gauges
2. To prolong the service of the 'Go' Gauge, wear allowance is provided during design of Gauges
3. All the Limit Gauges are designed considering only the wear allowance
4. Design of Limit Gauge must consider only the manufacturing tolerance

Which of the above statements are correct?

- (a) 1 and 4 only
- (b) 1 and 2 only
- (c) 2 and 3 only
- (d) 3 and 4 only

27. If in a machining operation doubling the cutting speed reduces the tool life to $\frac{1}{8}$ th of the original value, then the exponent 'n' reduces to:

- (a) $\frac{1}{8}$
- (b) $\frac{1}{4}$
- (c) $\frac{1}{3}$
- (d) $\frac{1}{2}$

28. A workpiece of diameter 300 mm and length 600 mm is to be turned. With a feed of 1.2 mm/rev , cutting speed of 162 m/min , and maximum allowable depth of 4.5 mm , the material removal rate is nearly:

- (a) $80.4 \times 10^4\text{ mm}^3/\text{min}$
- (b) $87.5 \times 10^4\text{ mm}^3/\text{min}$
- (c) $90.2 \times 10^4\text{ mm}^3/\text{min}$
- (d) $95.2 \times 10^4\text{ mm}^3/\text{min}$

29. Consider the following characteristics of a core:

- 1. Refractoriness
- 2. Permeability
- 3. Collapsibility
- 4. Strength

Which of the above characteristics of a core are correct for effective performance?

- (a) 1, 2 and 3 only
- (b) 1, 2 and 4 only
- (c) 1, 3 and 4 only
- (d) 1, 2, 3 and 4

30. In the context of Field Astronomy, the Co-latitude of the relevant pole is the angular distance from:

- (a) Zenith to Pole
- (b) Zenith to Azimuth
- (c) Zenith to Nadir
- (d) Prime vertical to zenith

31. The boundary of a mine is plotted on a scale of 1 : 2000. If a planimeter measures the plotted area as 60 cm^2 , the actual mine area is
- (a) 24000 m^2
 - (b) 12000 m^2
 - (c) 2400 m^2
 - (d) 1200 m^2
32. What is the distance (to nearest km) between two given points A and B along the $28^\circ 42' N$ parallel of latitude? (Take $\cos 28^\circ 42' = 0.8763$)
- 1. Longitude of A , $31^\circ 12' W$
 - 2. Longitude of B , $47^\circ 24' W$
- (a) 1577 km
 - (b) 1451 km
 - (c) 1270 km
 - (d) 1053 km
33. The length of a line measured with a 20 m chain was found to be 250 m . If the length of the chain is increased by 10 cm , what is the true length of the line?
- (a) 265.50 m
 - (b) 261.25 m
 - (c) 255.50 m
 - (d) 251.25 m

34. Which one of the following combination is called a 'Total Station'?
- (a) Electronic Theodolite + Electronic Distance Meter (*EDM*)
 - (b) Electronic level + Electronic Distance Meter (*EDM*)
 - (c) Electronic level + Tellurometer
 - (d) Tellurometer + Electronic Distance Meter (*EDM*)
35. What is the approximate net present value of *Rs. 900* at the end of *5 years* at *10 %* discount rate?
- (a) *Rs. 508*
 - (b) *Rs. 559*
 - (c) *Rs. 604*
 - (d) *Rs. 614*
36. In aerial photography, 'Rectification' is the process of rephotographing an aerial photograph to eliminate:
1. Tilt
 2. Parallax error
 3. Area error
 4. Elevation difference
- Which of the above are correct?
- (a) 2 and 3 only
 - (b) 1 and 4 only
 - (c) 1 only
 - (d) 4 only

37. The value of metal recovered out of an ore at a site is $Rs.210/kg$; and recovery of metal is 80%, by process of open pit mining. The production cost of mining inclusive of processing, but exclusive of overburden stripping, is $Rs.2000/tonne$. The overburden stripping cost is $Rs.150/m^3$ and the averaged stripping needed is $3.5 m^3/tonne$. The cut-off grade of the ore is nearly:

- (a) 1.7 %
- (b) 1.6 %
- (c) 1.5 %
- (d) 1.4 %

38. In respect of a photo theodolite, used in photogrammetric surveying, the 'Principal Plane' is perpendicular to the:

- 1. Picture plane
- 2. Camera plate
- 3. Fiducial trace
- 4. Focal length

Which of the above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 3 and 4 only
- (d) 1 and 4 only

39. When the airways are joined in parallel, the pressure drop across all of them is:
- (a) Different
 - (b) The sum of pressure drops across each of them
 - (c) Same
 - (d) Zero
40. The scale of an aerial photograph is $1\text{ cm} = 100\text{ m}$. The photograph size is $20\text{ cm} \times 20\text{ cm}$. How many photographs are required to cover an area of $8\text{ km} \times 12.5\text{ km}$, if the longitudinal lap is 60 % and the side lap is 30 %?
- (a) 109
 - (b) 119
 - (c) 129
 - (d) 139
41. An investment is profitable if internal rate of return (*IRR*) is:
- (a) Greater than the minimum rate of return fixed by the investor
 - (b) Less than the minimum rate of return fixed by the investor
 - (c) Equal to the minimum rate of return fixed by the investor
 - (d) Needed to be delinked from any prior stipulation of rate of return

42. A vertical photograph was taken at an altitude of 1200 m above the mean sea level (*mssl*). What is the scale of the photograph for terrain lying at elevation of 80 m and 300 m , if The focal length of the camera is 15 cm ?
- (a) 1:7467 and 1:6000
 - (b) 1:7985 and 1:6500
 - (c) 1:7467 and 1:6500
 - (d) 1:7985 and 1:6000
43. Fore bearing of a line AB is $12^{\circ}24'$. What would be its back bearing?
- (a) $192^{\circ}24'$
 - (b) $167^{\circ}36'$
 - (c) $137^{\circ}36'$
 - (d) $102^{\circ}24'$
44. Prismatic compass measures directly:
- (a) The reduced bearing
 - (b) The whole circle bearing
 - (c) Both reduced bearing and whole circle bearing
 - (d) Neither reduced bearing nor whole circle bearing

45. Mine dusts inhaled by workers produce a variety of Pneumokoniosis diseases. Of such dusts, which of the following minerals /metals/non-metals do not result in fibrosis?
- (a) Asbestos, Iron oxide; Barytes
 - (b) Silica, Asbestos; Chromite
 - (c) Barytes, Kaolin, Chromite
 - (d) Silica, Iron ore, Barytes

46. The velocity of circulating air in a mine roadway can be measured by the:
- 1. Smoke-Cloud method
 - 2. Tracer-Gas method
 - 3. Hot-Wire method

Which of the above methods are applicable?

- (a) 1 and 2 only
 - (b) 1 and 3 only
 - (c) 2 and 3 only
 - (d) 1, 2 and 3
47. One of the main problems / disadvantages associated with boundary ventilation system is:
- (a) Reversal of air flow
 - (b) Variable volumetric efficiency
 - (c) Lower head requirement
 - (d) Isolation of section in an emergency

48. Which of the following materials are very effective when used as standard stone dust?
1. Shale
 2. Dolomite
 3. Gypsum
 4. Limestone
- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 3 and 4 only
- (d) 1 and 4 only
49. A coal dust explosion will be classified as 'strong', based on the explosibility index, when the index is:
- (a) 0.1 to 0.5
- (b) 0.1 to 1
- (c) 10 to 20
- (d) 1 to 10
50. Which of the following chemicals the MSA detector tube contains, for testing the percentage of carbon monoxide gas?
- (a) Silica gel + Palladium Sulphate
- (b) Palladium Sulphate + Ammonium Molybdate
- (c) Silica gel + Ammonium Molybdate
- (d) Silica gel + Palladium Sulphate + Ammonium Molybdate

51. In the Draeger Self-contained Breathing Apparatus, used for mine rescue and safety operations, the CO_2 gas is absorbed by:
- (a) Anhydrous Sodium Hydroxide
 - (b) Anhydrous Calcium Chloride
 - (c) Potassium Hydroxide
 - (d) Potassium Permanganate
52. The samples of air collected from the intake end and the return end of a Panel showed 0.2 % and 0.7 % of methane content, respectively. What is the methane emission from the Panel, if the production is 1000 T/day , and the quantity of air circulation is $20 m^3/s$?
- (a) $8.64 m^3/s$
 - (b) $7.64 m^3/s$
 - (c) $6.98 m^3/s$
 - (d) $5.98 m^3/s$
53. The resistance of a mine airway is expressed in terms of the area of an equivalent orifice. If the area of the equivalent orifice is $0.07 m^2$, the resistance of the mine airways, to the nearest 10 units, is:
- (a) $340 N s^2 m^{-8}$
 - (b) $340 N s^2 m^{-6}$
 - (c) $330 N s^2 m^8$
 - (d) $330 N s^2 m^6$

54. In shallow mines, the major contributing factor to the direction of natural ventilation is:
- (a) Underground temperature
 - (b) Surface temperature
 - (c) Underground temperature as well as by surface temperature
 - (d) No definable dependence on the underground temperature and/or the surface temperature

55. For underground mine ventilation, a fan has to be selected basically to cope with the demand of:
- 1. Pressure of the air to be maintained in the mine ventilation
 - 2. Quantity of air through-put by the ventilation

Which of the above choices is/ are relevant?

- (a) 1 only
 - (b) 2 only
 - (c) Both 1 and 2
 - (d) Neither 1 nor 2
56. Which one of the following statements is correct?
- (a) Diffusers are fitted to exhaust fans
 - (b) Evasees are fitted to forcing fans
 - (c) Diffusers as well as Evasees are fitted to forcing fans
 - (d) Evasees are fitted to exhaust fans

57. In an airway, given that the pressure drop is ΔP and that the quantity of airflow is Q , the resistance of the airway is of:

(a) $\frac{\Delta P}{Q^3}$

(b) $\frac{\Delta P}{Q^2}$

(c) $\frac{\Delta P}{Q}$

(d) $\left(\frac{\Delta P}{Q}\right)^2$

58. Shrinkage stoping operations are not suitable for the following conditions:

1. Mildly sloping deposits
2. Fairly high ore grade
3. Oxidizing characteristics of ore
4. Depths less than 800 *m*

(a) 1 and 3 only

(b) 1, 2 and 3 only

(c) 1 and 4 only

(d) 1, 2 and 4 only

59. Vertical Crater Retreat (VCR) method of mine production requires:

(a) Large parallel downhole drilling

(b) Small diameter upward drilling

(c) Ring pattern drilling

(d) Horizontal and angle drilling

60. Shrinkage stoping is suitable for:

1. Thin ore body
2. Thick ore body

Which of the above is/are are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

61. While adopting the Bord and Pillar method, the prime consideration in respect of the panel sizing is:

- (a) Incubation period of the coal seam
- (b) Depth of coal seam
- (c) Thickness of the coal seam
- (d) Layout of the face

62. Rill stoping method is a form of:

- (a) Underhand stoping
- (b) Block caving
- (c) Artificially supported stoping
- (d) Overhand stoping

63. Consider the following data related to a dragline:

- Scheduled shift hours = 5000
- Maintenance hours = 1000
- Breakdown hours = 150

What is the percentage availability of dragline?

- (a) 85 %
- (b) 83 %
- (c) 80 %
- (d) 77 %

64. In opencast mining operation, selective mining is possible with:

- (a) Shovel and dumper combination
- (b) Dragline
- (c) Payloader
- (d) Continuous surface miner

65. An underground coal mine is being operated using Bord and Pillar method. When the density of the strata is $2.3 \text{ tonnes}/\text{m}^3$, the depth of working is 200 m , and extraction is 25 % , the load on pillars is, nearly:

- (a) $61 \text{ kg}/\text{cm}^2$
- (b) $81 \text{ kg}/\text{cm}^2$
- (c) $125 \text{ kg}/\text{cm}^2$
- (d) $182 \text{ kg}/\text{cm}^2$

66. In surface mining bucket wheel excavator can give:
- (a) Frontal cut
 - (b) Parallel cut
 - (c) Terrace cut
 - (d) Perpendicular cut
67. A pressure tunnel was subjected to a testing pressure of 20 kg/cm^2 . What will be the diametral deformation given that the diameter of the tunnel is 3 m , the modulus of elasticity of rock material is $2.5 \times 10^3 \text{ kg/cm}^2$, and Poisson's ratio of rock material is 0.3?
- (a) 3.12 cm
 - (b) 6.24 cm
 - (c) 12.4 cm
 - (d) 31.2 cm
68. A rock sample has bulk density of 2.90 g/cc . When its moisture content is 1.40 %, its dry density will be nearly:
- (a) 2.59 g/cc
 - (b) 2.69 g/cc
 - (c) 2.86 g/cc
 - (d) 2.96 g/cc

69. Increase in moisture content of rock:
- (a) Increases its bearing capacity
 - (b) Decreases its bearing capacity
 - (c) Has no effect on its bearing capacity
 - (d) First increases and then decreases its bearing capacity
70. Permitted explosives used in blasting off the solid in underground coal mine of degree-1 Gassy seam is:
- (a) *P-1*
 - (b) *P-3*
 - (c) *P-5*
 - (d) *P-4*
71. Punching shear strength of a dry rock specimen is reckoned to be nearly:
- (a) Equal to the value of a wet rock specimen
 - (b) Twice the value of a wet rock specimen
 - (c) Thrice the value of a wet rock specimen
 - (d) Less than the value of a wet rock specimen
72. Shear strength of rock is influenced by:
- (a) Cohesion
 - (b) Dilatancy
 - (c) Internal friction
 - (d) Cohesion, dilatancy and internal friction

73. Which one of the following statements is correct?
- (a) The harder and more coherent the strata, the greater the angle of draw, and steeper the line of fracture
 - (b) The softer the strata, the greater the angle of draw, and flatter the line of fracture
 - (c) The softer the strata, the smaller the angle of draw, and flatter the line of fracture
 - (d) The harder and more coherent the strata, the greater the angle of draw, and flatter the line of fracture
74. Which one of the following type of crushers is normally selected for crushing tough, hard and abrasive materials?
- (a) Double toggle Blake
 - (b) Double toggle Blake
 - (c) Dodge
 - (d) Jaw
75. Compressive strength of a rock:
- (a) Decreases with an increase in its porosity
 - (b) Increases with an increase in its porosity
 - (c) Decreases with a decrease in its porosity
 - (d) Remains constant with minor changes in its porosity

76. In case of roll crushers, the relationship between co-efficient of friction μ offered by roll and the angle of nip θ is:

(a) $\mu = \tan\left(\frac{\theta}{2}\right)$

(b) $\mu = \tan^2\left(\frac{\theta}{4}\right)$

(c) $\mu = \tan\left(\frac{\theta}{4}\right)$

(d) $\mu = \tan^2\left(\frac{\theta}{2}\right)$

77. What is the speed required to perform the operation of drilling a hole of 20 mm diameter at a cutting speed of 25 m/min?

(a) 398 rpm

(b) 492 rpm

(c) 548 rpm

(d) 624 rpm

78. Crushers used in handling friable, sticky, frozen and less abrasive feeds are:

(a) Jaw crushers

(b) Gyratory crushers

(c) Roll crushers

(d) Either jaw, or roll, crushers

79. A hole of 25 mm diameter and 62.5 mm depth is to be drilled, the suggested feed is 1.25 mm/rev and the cutting speed is 60 m/min. If the tool approach and tool over travel is 5 mm, the cutting time will be nearly:
- (a) 0.10 min
 - (b) 0.09 min
 - (c) 0.08 min
 - (d) 0.07 min
80. A hole is being drilled in a block of magnesium alloy with a 10 mm drill at a feed of 0.25 mm/rev. When the spindle is running at 1000 rpm, the material removal rate will be nearly:
- (a) 19935 mm³/min
 - (b) 19635 mm³/min
 - (c) 18935 mm³/min
 - (d) 18635 mm³/min
81. During blasting operations, rock fragmentation occurs due to:
- 1. Reflection of the compressive wave generating tensile and shear wave
 - 2. High vibration frequency
- (a) 1 only
 - (b) 2 only
 - (c) Both 1 and 2
 - (d) Neither 1 nor 2

82. Which of the following statements are correct regarding machine tools?

1. A pillar drilling machine drills holes upto 70 mm
 2. A regulating wheel is a component of any surface grinding machine
 3. A sensitive drilling machine is also known as the bench drilling machine
- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

83. Hoskold's formula is relevant for:

- (a) Mine valuation
- (b) Ore reserve estimation
- (c) Depreciation calculation
- (d) Salting

84. Which one of the following statements is correct?

- (a) *DTH* is a rotary drill
- (b) Jack Hammer is a percussive drill
- (c) *DTH* is a rotary- cum- percussive drill
- (d) Jack Hammer is a rotary- cum - percussive drill

85. Which one of the following statements is correct?

- (a) Drag bits and button bits are used in rotary drills
- (b) Chisel bits and roller bits are used in percussive drills
- (c) Cross bits and drag bits are used in rotary drills
- (d) Chisel bits and button bits are used in percussive drills

86. Rock Texture Coefficient, TC , is calculated by using the following formula

$$TC = AW \left[\left\{ \frac{N_0}{N_0 + N_1} \times \frac{1}{F F_0} \right\} + \left\{ \frac{N_1}{N_0 + N_1} \times A R_1 \times A F_1 \right\} \right]$$

AW refers to:

- (a) Grain size
- (b) Grain packing weighting
- (c) Hardness coefficient
- (d) Aspect ratio

87. 'Drillability of Rocks' is premised on:

1. Specific energy required
 2. New surface area created
 3. Heat generated during drilling
- (a) 1, 2 and 3
 - (b) 1 and 3 only
 - (c) 1 and 2 only
 - (d) 2 and 3 only

88. Which of the following theories relate to rock drilling operations?

1. Ernst & Merchant theory
 2. Evans theory
 3. Nishimatsu's theory
 4. Solomon theory
- (a) 2, 3 and 4 only
- (b) 1, 2 and 4 only
- (c) 1, 3 and 4 only
- (d) 1, 2 and 3 only

89. Which of the following methods qualify as electrical logging?

1. Spontaneous potential logging
 2. Resistivity logging
 3. Sonic logging
 4. Induction logging
- (a) 2, 3 and 4 only
- (b) 1, 3 and 4 only
- (c) 1, 2 and 4 only
- (d) 1, 2 and 3 only

90. Which of the following statements are correct?

1. Electromagnetic methods are suitable for ore body of poor conductivity
 2. Resistivity methods are suitable for ore body of poor conductivity
 3. Potential Drop Ratio methods are suitable for ore body of poor conductivity
 4. Electromagnetic methods are suitable for ore body of high conductivity
- (a) 2, 3 and 4 only
- (b) 1 and 3 only
- (c) 2 and 4 only
- (d) 1, 2 and 3 only

91. Which of the following statements conform to electrical method of prospecting?

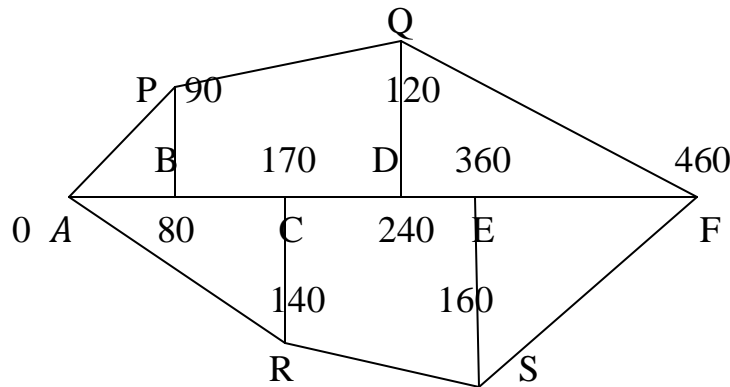
1. Resistivity methods require direct contact with the earth
 2. Electromagnetic method does not require direct contact with the earth
 3. Equi-Potential line methods require direct contact with the earth
- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 1, 2 and 3
- (d) 2 and 3 only

92. Which of the following is not associated with a longwall face?
- (a) Tail gate
 - (b) Main gate
 - (c) Buttock
 - (d) Pillar
93. Torsion Balance is an instrument used for:
- (a) Electrical methods of prospecting
 - (b) Magnetic methods of prospecting
 - (c) Gravity methods of prospecting
 - (d) Seismic methods of prospecting
94. A fault in which the hanging wall is displaced upwards relative to the footwall is known as a:
- (a) Normal fault
 - (b) Step fault
 - (c) Fault trough
 - (d) Reverse fault
95. Which of the following identifies Rutile?
- (a) $Ti O_2$
 - (b) $Fe TiO_2$
 - (c) $Ti O_3$
 - (d) $Fe TiO_3$

96. In an area, a bed of sandstone is exposed. The slope of the ground and of the dip of the bed are $10^\circ W$ and $20^\circ E$, respectively. If the width of the outcrop is 60 m , the true thickness of the sandstone bed is:

- (a) 20 m
- (b) 30 m
- (c) 40 m
- (d) 50 m

97. A survey is run on the stem-line $A - B - C - D - E - F$ and the distance to the peripheral points on the surveyed field are also shown. All the distances are in meters. What is the area of the field?



- (a) 77200 m^2
- (b) 78400 m^2
- (c) 82000 m^2
- (d) 86000 m^2

98. Which of the following operations is/are not related to coal cutting machines?

1. Under-cutting
 2. Over-cutting
 3. Middle-cutting
 4. Side-cutting
- (a) 2 and 3 only
- (b) 1 and 2 only
- (c) 1 only
- (d) 4 only

99. Which one of the following statements is not correct?

- (a) Shortwall coal cutting machines can be used for longwall faces
- (b) Shearers can be used in for longwall faces
- (c) Gathering arm loaders can be used in Bord and Pillar workings
- (d) Ploughs can be used in longwall faces

100. In a belt conveyer system, the function of the snub pulley is to:

- (a) Clean the inner surface of the belt
- (b) Clean the outer surface of the belt
- (c) Increase the arc of contact with the drive drum
- (d) Decrease the belt tension