3 A

R 1. What does "Hydraulic Gradient Line" (HGL) represent in fluid flow?

(A) Piezometric head available to a fluid during the flow

(B) Pressure head available to a fluid during the flow

(C) Velocity head available to a fluid during the flow

(D) Total head available to a fluid during the flow

W 2. When the support is hinged, the number of reactions will be

(A) 2 ✓

(B) 1

(C) 3

(D) 4

3. Which of the following is applicable in case of water tube boiler?

(A) Generation of steam is much quicker in case of water tube boiler than in fire tube boiler ✓

(B) Generation of steam is slower in case of water tube boiler than the fire tube boiler

(C) Time required for generation of steam is same in case of water tube boiler and fire tube boiler

(D) Time required for generation of steam is independent of the type of boiler

4. What is the SI unit of Coefficient of coupling?

(A) Unitless ✓

(B) Lumen

(C) Henry/meter

(D) Henry

5. The Compressive strength of concrete is based on test performed upon concrete cube after how many days of mixing?

(A) 28 days ✓

(B) 18 days

(C) 38 days

(D) 30 days

6. Annual rental value is generally fixed at

(A) 1 to 2% of value of building

(B) 2 to 5% of value of building

(C) 5 to 10% of value of building ✓

(D) 10 to 25% of value of building

7. What is the range of voltage used for EHV lines?

(A) Below 1 kV

(B) 100 kV-150 kV

(C) 200 kV-250 kV

(D) 300 kV-750 kV ✓

8. What is the part of an overhead line between two consecutive supports called?

(A) Sag

(B) Span ✓

(C) Conductor

(D) Stensile

9. What happens to potential distribution if the value of string efficiency is higher?

(A) Zero

(B) More uniform ✓

(C) Uneven

(D) Increased shunt capacitance

R 10. If the duty is 1725 ha/cumec and the delta is 0.627 m, the Base period is

(A) 120 days

(B) 125 days ✓

(C) 130 days

(D) 135 days

11. Which of the following statements is applicable for the total heat supplied to the system?

(A) Total heat supplied is used to increase the internal energy of the system only

(B) Total heat supplied is used to do the external work only

(C) Total heat supplied is used partly to increase the internal energy of the system and partly to do some external work ✓

(D) Total heat supplied is rejected without carrying out any action

12. The hypotenusal allowance per chain of 30 m length, if the ground rises by 4 m in one chain length is

(A) 0.16 m

(B) 0.26 m ✓

(C) 0.34 m

(D) 0.30 m

W 13. On which of the following cycle petrol engines work?

(A) Carnot Cycle •

(B) Otto Cycle ✓

(C) Diesel Cycle

(D) Joule Cycle

W 14. The rocks formed due to alteration of original structure under heat and excessive pressure are called

(A) Igneous rocks

(B) Sedimentary rocks •

(C) Metamorphic rocks ✓

(D) Argillaceous rocks

R 15. Which of the following is the CORRECT statement?

(A) Increase in water-cement ratio decreases the strength of concrete ✓

(B) Increase in water-cement ratio increases the strength of concrete

(C) Water-cement ratio has no effect on the strength of concrete

(D) Decrease in water-cement ratio increases the workability of concrete

$$\frac{4}{3 \times 10} = 1.33$$

$$= 0.13$$

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R 16. In analysis of rates, contractor profit is taken at the rate of

(A) 1%

(B) 5%

(C) 10% ✓

(D) 20%

R 17. In an under-reinforced beam

(A) the depth of neutral axis is less than the maximum depth of neutral axis ✓

(B) the depth of neutral axis is more than the maximum depth of neutral axis

(C) the depth of neutral axis is equal to the maximum depth of neutral axis

(D) the area of steel is more than the required maximum percentage of steel

R 18. What is the recommended mix for the construction of long span arches?

(A) 1:1:2 ✓

(B) 1:2:2

(C) 1:3:6

(D) 1:4:8

19. Which of the following is based on the First Law of thermodynamics?

(A) Pascal's Law ·

(B) Dalton's Law of partial pressure

(C) Avogadro's Law

(D) Law of Conservation of Energy ✓

20. Which of the following types of stress causes fatigue failure in any metal part/component in motion?

(A) Tensile Stress ○

(B) Compressive Stress

(C) Torsional Stress

(D) Fluctuating Stress ✓

R 21. What is the assumed maximum strain in concrete for limit state of collapse in flexure?

(A) 0.0035 ✓

(B) 0.035

(C) 0.35

(D) 3.5

22. Which type of welding is used in ship building industry for splicing and fabricating sub-assemblies?

(A) Carbon arc welding

(B) Submerged arc welding ✓

(C) Inert gas metal arc welding

(D) Electron beam welding

23. Which type of kinematic pair is formed in ball bearing?

(A) Rolling Pair ✓

(B) Sliding Pair

(C) Screw Pair

(D) Spherical Pair

24. Which of the following is the expression for mass density of a substance?

(A) Volume/mass

(B) Mass/volume

(C) mass x volume

(D) mass x (volume)²

25. The minimum shear reinforcement is provided in a beam if

(A) nominal shear stress is less than the design shear strength of concrete

(B) nominal shear stress is more than the design shear strength of concrete

(C) nominal shear stress is equal to the design shear strength of concrete

(D) nominal shear stress is equal to the permissible shear stress

26. The amount of voltage induced in the conductor is proportional to

(A) sinusoidal nature

(B) area of cross section of conductor

(C) force acting on conductor

(D) the speed of flux cutting action

27. In which of the following process of vapour compression refrigeration cycle, vapour refrigerant is converted into liquid refrigerant?

(A) Compression

(B) Condensation

(C) Expansion

(D) Evaporation

28. Winding pitch for a multiplex wave winding of a DC machine is given by

(A) $Y=[2C \pm 4(m)]/(P/4)$

(B) $Y=[2C \pm 2(m)]/(P/2)$

(C) $Y=[4m \pm 2(m)]/(P/2)$

(D) $Y=[2C \pm 2(m)]/(P/4)$

29. If D is the diameter of pelton wheel and d is the diameter of the jet, then the number of buckets on the periphery of a pelton wheel is equal to

(A) $D/2d$

(B) $D/2d + 15$

(C) $D/2d + 10$

(D) $D/2d + 20$

30. Bandwidth and CMRR of an ideal op-amp should be

(A) ∞ and 0

(B) 0 and 0

(C) 0 and ∞

(D) ∞ and ∞

31. The value of load which has a 95% probability of NOT being exceeded during the life time of the structure is known as

(A) characteristic load

(B) collapse load

(C) ultimate load

(D) working load

R 32. What is the specific weight of water in S.I. units?

(A) 9.81 gm

(B) 981 gm

(C) 9.81 kN/m³ . ✓

(D) 9.81 x 10³kN/m²

33. According to Faraday's second law of electrolysis, chemical equivalent is the ratio of

(A) molecular weight to atomic weight

(B) molecular weight to valency

(C) valency to atomic weight

(D) atomic weight to valency ✓

34. The energy stored by a capacitor is given by

(A) $0.5 \, LI^2$

(B) $0.5 \, CV^2$ ✓

(C) C^2V

(D) Q/CV

R 35. Which of the following is a type of beam in which one end is fixed and the other end is free?

(A) Simply supported beam

(B) Cantilever beam ✓

(C) Overhanging beam

(D) Continuous beam.

36. Which of the following is a non-positive displacement compressor?

(A) Centrifugal Compressor ✓

(B) Screw Compressor

(C) Roots Blower Compressor

(D) Lysholm Compressor

R 37. The minimum crushing strength required for a brick as per BIS:1077-1957 is

(A) $2.5 \, N/mm^2$

(B) $5 \, N/mm^2$

(C) $3.5 \, N/mm^2$ ✓

(D) $6 \, N/mm^2$

R 38. The target of the Second Twenty Year Road Development Plan is to provide a total road length of

(A) 8 km per 100 sq. km area

(B) 12 km per 100 sq. km area

(C) 24 km per 100 sq. km area

(D) 32 km per 100 sq. km area ✓

39. A pumping set with a mortar has been installed in a building at a cost of Rs. 4,500. Assuming the life of the pump as 15 years, what is the amount of annual installment of sinking fund required to be deposited to accumulate the whole amount of 4% compound interest?

(A) Rs. 225 ✓

(B) Rs. 250

(C) Rs. 275

(D) Rs. 200

40. In which of the following type of boiler, water passes through the tube and fire surrounds the tube?

(A) Fire tube boiler

(B) Water tube boiler

(C) Fluidized bed combustion boiler

(D) Pulverized boiler

41. Cogeneration is also called as

(A) Carbon High Power

(B) Combined Horse Power

(C) Carbon Horse Power

(D) Combined Heat and Power

42. In a n-type semiconductor, the number of holes

(A) are equal to number of electrons

(B) are greater than the number of electrons

(C) are less than the number of electrons

(D) cannot be defined

43. Which of the following cycles is used in steam power plant?

(A) Carnot Cycle

(B) Rankine Cycle

(C) Joule Cycle

(D) Dual Cycle

44. ISMB is known as

(A) Indian Standard Medium Beam

(B) Indian Standard Middle Beam

(C) International Standard Medium Beam

(D) International Standard Middle Beam

45. Increase in carbon content in steel increases its

(A) tensile strength

(B) ductility

(C) weldability

(D) softness

46. Curve having ordinate of some particular function due to unit load acting at that point is known as

(A) influence line

(B) random line

(C) curve line

(D) redundant line

47. Shaded pole induction motor has

(A) high starting torque, low power factor and low efficiency

(B) poor starting torque, unity power factor and low efficiency

(C) poor starting torque, low power factor and low efficiency

(D) high starting torque, unity power factor and high efficiency

48. Which code is used for designing steel structures in general building construction?

(A) IS 800-2007

(B) IS 456-2000

(C) IS 123-2005

(D) IS 400-2007

49. A three phase 50 Hz overhead transmission line has R=28 Ω, X=63 Ω and Y=4*10⁻⁴ Ω⁻¹, if the load at receiving end is 75 MVA at 0.8 power factor with 132 kV between lines. Determine the receiving end current.

(A) 414 A

(B) 4.14 A

(C) 328 A ✓

(D) 3.327 A

50. What is the field excitation condition while performing slip test on an alternator?

(A) Field should be open ✓

(B) Field should be over excited

(C) Field should be reversed

(D) Field should be connected to armature along with high resistance

R 51. In which of the following types of manometer, the same liquid whose pressure is to be measured rises in a tube?

(A) Piezometer ✓

(B) U - tube manometer

(C) Differential Manometer

(D) Inverted U - tube differential manometer

52. Which of the following is a boiler mounting?

(A) Water Level Indicator ✓

(B) Economiser

(C) Air Preheater

(D) Superheater

R 53. What will be the maximum bending moment in a cantilever beam of span 4 m and having uniformly distributed load of 3 kN/m?

(A) 24 kN. m ✓

(B) 12 kN. m

(C) 6 kN. m

(D) 3 kN. m

R 54. In columns when both ends are restrained against translation and rotation, the effective length is

(A) 1L

(B) 2L

(C) 1.2L

(D) 0.65L ✓

R 55. Kuichling's formula for fire demand is given by

(A) 3182√P ✓

(B) 5663√P

(C) 1136(P/5+10)

(D) 4637√P(1-0.01√P)

56. A 1 km long LT overhead distribution line is to be erected from 125 kVA pole mounted substation. PCC poles of 8 m are to be used with a span of 50 m. Calculate the number of poles required.

(A) 51

(B) 125/400

(C) 21 ✓

(D) 50/8

57. In a detailed estimate, the provisions for contingencies is usually

(A) 1%

(B) 3% to 5% ✓

(C) 10%

(D) 12% to 15%

58. A fully saturated clay specimen is subjected to a pressure of 240 kN/sq. m in the consolidation test. After a period of time when the average pore pressure is 80 kN/sq. m, the degree of consolidation is

(A) 60

(B) 66.66 ✓

(C) 70

(D) 77.77

59. Which of the following is the property of a fluid by virtue of which it offers resistance to flow of motion?

(A) Specific Weight

(B) Specific Gravity

(C) Viscosity ✓

(D) Surface Tension

60. The value of partial safety factor in limit state of collapse for the combination of dead and live load is

(A) 1.5 ✓

(B) 1.2

(C) 1

(D) 0.8

61. What is the reciprocal of sensitivity called?

(A) Deflection factor ✓

(B) Critical factor

(C) Quality factor

(D) Resolution factor

62. Which of the following type of efficiency of turbine is defined as the ratio of power available at the turbine shaft to the power produced by runner?

(A) Hydraulic efficiency

(B) Mechanical efficiency ✓

(C) Volumetric efficiency

(D) Overall efficiency

63. Which of the following is a determinate structure?

(A) 3 hinged arch ✓

(B) 2 hinged arch

(C) Fixed beam

(D) Continuous beam

64. For a 45° cranked or bent up bar the additional length for one bent up is

(A) 0.36 d

(B) 0.42 d ✓

(C) 0.24 d

(D) 0.60 d

65. What is the minimum ductility value that has been specified by the ISI for bitumens of grades 45 and above?

(A) 35 cm

(B) 50 cm

(C) 75 cm ✓

(D) 80 cm

66. The distance between two points A and B on a plan was found to be 240 m when measured with a scale with R.F of 1/1000. The distance between the same points with a R.F of 1/500 will be

(A) 240 m •

(B) 480 m

(C) 120 m ✓

(D) 60 m

67. Grades of Concrete in Indian Standard Code are specified and designated by

(A) mix ✓

(B) durability

(C) workability

(D) quality

68. Which of the following process is known as isothermal process?

(A) Constant pressure process

(B) Constant volume process

(C) Constant temperature process ✓

(D) Constant enthalpy process

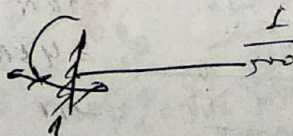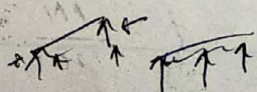69. The straight line curve in Stress-Strain diagram of steel obeys

(A) Hooke's law ✓

(B) Charles's law

(C) Newton's law

(D) Curve's law

70. What will be the shear force at the centre in a simply supported beam of span 5 m having U.D.L of 2 kN/m in entire length?
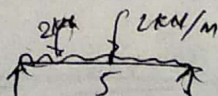
(A) 0 kN ✓

(B) 2 kN

(C) 5 kN

(D) 10 kN

71. Which of the following is the unit of Brake Power?

(A) kN

(B) kN.m

(C) kN/m²

(D) kW ✓
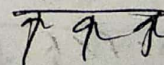
72. The relation between total pressure s, effective pressure s' and pore pressure u, is

    (A) s' = s + u

    (B) s' = s - u ✓

    (C) s = s' / u

    (D) s = s' * u

73. The placing of rails of the track at an inward slope of 1 in 20 is known as

    (A) hogging of rails

    (B) buckling of rails

    (C) creep of rails

    (D) tilting of the rails ✓

74. Batching of the material in making concrete should be done preferably by

    (A) weight ✓

    (B) volume

    (C) size

    (D) wooden box

75. Which of the following is most suitable for standby power plant?

    (A) Hydraulic power plant •

    (B) Steam power plant

    (C) Diesel power plant ✓

    (D) Nuclear power plant

76. Which of the following types of steel is having higher hardness?

    (A) Dead Mild Steel

    (B) Low Carbon Steel

    (C) Medium Carbon Steel

    (D) High Carbon Steel ✓

77. On what factor does the electrical resistance of a conductor directly vary with?

    (A) Volume of the conductor

    (B) Eddy current

    (C) Inductance of the conductor

    (D) Length of the conductor ✓

78. The silica in portland cement is

    (A) 5 to 15% •

    (B) 17 to 25% ✓

    (C) 27 to 40%

    (D) 42 to 60%

79. Compaction in concrete is done to eliminate

    (A) air bubbles ✓

    (B) water

    (C) impurities

    (D) cement

80. Which of the following chloride is insoluble in water?

    (A) $BeCl_2$

    (B) KCl

    (C) $AgCl_2$ ✓

    (D) $MgCl_2$

$\int 2kN/m$

$s' = s + u$

line → 60-67

Alumni → 17 25

sides → 3-8

$R = \rho \frac{\ell}{A}$

$G = \frac{1}{\rho} \cdot \frac{A}{\ell}$

81. For a design speed of 60 kmph, for a two way traffic on a two lane road, if the co-efficient of friction is 0.35 and reaction time of driver is 2.5 seconds, the stopping sight distance would be

(A) 72.32 m

(B) 82.11 m ✓

(C) 76.47 m

(D) 80.64 m

82. Which cooling system is employed for engine of motor cycle, scooter and mopeds?

(A) Air cooling ✓

(B) Water cooling

(C) Oil cooling .

(D) Powder cooling

83. What is the function of evaporator in refrigeration plant?

(A) To absorb heat from the body to be cooled using refrigerant ✓

(B) To increase pressure and temperature of refrigerant

(C) To cool down the temperature of refrigerant by throwing out heat

(D) To reduce pressure on refrigerant

84. The slot angle of an alternator, where n= slots per pole and m= slots per pole per phase, is given by

(A) $\beta = 180/2n$

(B) $\beta = 180/m$

(C) $\beta = n/180$

(D) $\beta = 180/n$ ✓

85. The length of a survey line measured with a 20 m chain was found to be 520 m. When the chain was compared with a standard chain it was found to be 10 cm too long. The true length of the line is

(A) 522 m

(B) 517.4 m

(C) 522.6 m. ✓

(D) 524.2 m

86. The tensile strength of concrete is normally in which percentage slab of its compressive strength?

(A) 8-12% ✓

(B) 4-8%

(C) 12-16%

(D) 16-20%

87. Which type of DC armature windings require equalizer rings?

(A) Wave winding

(B) Square winding

(C) Triangular wave winding

(D) Lap winding ✓

$f = 0.35 \quad V = 60$

$R = 2.5 \quad SSD =$

R 88. Which of the following is applicable for steam turbine?

(A) Heat energy is converted into mechanical work

(B) Mechanical work is converted into heat energy

(C) Electrical energy is converted into mechanical work

(D) Nuclear energy is converted into mechanical work

R 89. Hydrostatic pressure on a dam depends upon its

(A) length

(B) depth

(C) material

(D) breadth

90. What is the current obtained when a 30 V voltage source with an internal resistance of 6Ω is transformed to a current source?

(A) 5 A

(B) 180 A

(C) 150 A

(D) It cannot be transformed

R 91. Doubly reinforced sections are generally adopted when

(A) design moments exceed the moment of resistance of singly reinforced section

(B) moment of resistance of singly reinforced section exceeds the design moments

(C) dimensions of the beam are not predetermined

(D) length of the beam is fixed

R 92. What will be the quantity of water required per bag of cement for water-cement ratio of 0.55?

(A) 27.5 litres

(B) 30 litres

(C) 25 litres

(D) 22.5 litres

93. The odour of water can be determined by

(A) Silica scale

(B) Platinum cobalt scale

(C) Osmoscope

(D) Nephelometer

R 94. Mercury is used in barometers because

(A) it is a perfect fluid

(B) its volume changes with temperature

(C) it is a liquid metal

(D) it gives less height of column for high pressure

R 95. What will be the value of reactions in a simply supported beam of 4 m span having two point loads of 2 kN each at 1 m and 3 m distance from any support?

(A) 2 kN ✓

(B) 1 kN

(C) 4 kN

(D) 8 kN

R 96. The modulus of elasticity for structural steel is normally

(A) 200000 N/sq. mm ✓

(B) 100000 N/sq. mm

(C) 300000 N/sq. mm

(D) 400000 N/sq. mm

97. The volume of the measurement box used to measure stone aggregates and sand is

(A) 1 cu. ft

(B) 1.25 cu. ft ✓

(C) 1.5 cu. ft

(D) 1.75 cu. ft

98. What is the total inductance of the circuit having $L_1 = 5$ H, $L_2 = 10$ H connected in series and mutual inductance of 3 H?

(A) 21 H ✓

(B) 12 H

(C) 11 H

(D) 3 H

R 99. Indeterminate structures are those when

(A) number of reactions are more than number of equilibrium conditions ✓

(B) number of equilibrium conditions are more than number of reactions

(C) number of joints are more than number of members

(D) number of members are more than number of equilibrium conditions

100. In a single phase reluctance motor, the rotating field is produced by

(A) capacitor with field winding

(B) main and auxiliary winding ✓

(C) auxiliary winding only

(D) main winding only

101. Which of the following component is replaced by absorber, generator and analyser in vapour absorption refrigeration system?

(A) Compressor ✓

(B) Condenser

(C) Expansion device

(D) Evaporator

R 102. Which of the following represents the point about which floating body starts oscillating when tilted by a small angle?

(A) Center of gravity of displaced fluid

(B) Center of buoyancy

(C) Pressure center

(D) Metacenter. ✓
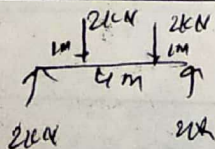
$E_3 = 2 \times 10^5$ N/mm^2 $m = 2j - 3$

$E = 200000$ N/mm^2 $m7$

103. Which of the following is also known as dynamic head of fluid?

(A) Pressure head

(B) Kinetic head ✓

(C) Datum head •.

(D) Piezometric head

104. As per the recommendations of IS, the shape of the lined canal is

(A) trapezoidal ✓

(B) semicircular

(C) parabolic

(D) elliptic

105. When the natural moisture content, plastic limit and plasticity index of a soil are 20%, 30%, 25% respectively, then the liquidity index is

(A) -0.4 ✓

(B) 0.4

(C) 0.33

(D) -0.2

106. Delta(D) in cm, Duty(d) in hectare/cumec and Base Period(B) in days are related as

(A) D=864 B/d ✓

(B) B=864 d/D

(C) B=864 D/d

(D) d=8.64 B/D

107. Which instrument is used to measure the earth resistance?

(A) Kelvin bridge

(B) Wien bridge

(C) Megger ✓

(D) Schering bridge

108. What is the impedance of a circuit containing a resistance of 8Ω and inductance of 0.08 H across a supply of 100 V with a frequency of 25 Hz?

(A) $12.5\ \Omega$

(B) $14.9\ \Omega$ ✓

(C) $16.8\ \Omega$

(D) $225\ \Omega$

109. Harmonics in alternators can be reduced by

(A) decreasing length of air gap

(B) using full pitch winding

(C) chording and skewing ✓

(D) using concentrated winding

110. What is the function of volute in centrifugal pump?

(A) Impart kinetic energy to fluid by rotating it

(B) Convert kinetic energy of fluid into pressure energy ✓

(C) Protection to other delicate parts of the pump

(D) To improve aesthetics of the pump

$W_N = 0.20$

$W_p = 0.30$

$I_p = W_L - W_p = 0.25$

$I_L = \dfrac{W_H - W_p}{} = \dfrac{0.20 - 0.30}{0.25}$

pressure head = breaks him

$\dfrac{-10^2}{Rs} = 0.4\ \dfrac{P}{Pg}$

dynamic head

$\dfrac{P}{g} + \dfrac{v^2}{g} + z,$

$\Delta = \dfrac{8.64\ B}{D}\ m$

$D = \dfrac{8.64\ B}{d}\ m$

111. An example of a tension member in a steel structure is

(A) Tie ✓

(B) Strut

(C) Post

(D) Tee

112. Which one of the following is the firing order in a six cylinder I.C. engine?

(A) 1-5-3-6-2-4 ✓

(B) 6-5-4-1-2-3

(C) 1-2-3-4-5-6

(D) 1-5-2-4-3-6

113. As compared to total cost of construction of a building, scrap value is taken as

(A) 50%

(B) 25%

(C) 33%

(D) 10% ✓

114. Resistance of the ammeter and its connection with the load should be

(A) high and in series

(B) high and in parallel

(C) low and in series ✓

(D) low and in parallel

115. SI unit of Luminous efficiency is

(A) lumen/watt ✓

(B) watt

(C) lumen

(D) Candela .

116. Which of the following represents the ratio of "inertia forces to viscous forces"?

(A) Nusselt number

(B) Prandtl number

(C) Reynolds number ✓

(D) Grashof number

117. Which of the following is a major advantage in using steel as structural material?

(A) High strength per unit weight ✓

(B) Less corrosion

(C) Fire resistant ✗

(D) Less heat conductor ✗

118. If three resistances $R_1 = 10\Omega$, $R_2 = 20\Omega$ and $R_3 = 30\Omega$ are connected in series across 60V supply, what is the voltage across R_2?

(A) 10 V

(B) 20 V ✓

(C) 30 V

(D) 55 V

119. Which of the following type of mixture strength is required for acceleration?

(A) Lean mixture

(B) Chemically correct A/F ratio

(C) Rich mixture ✓

(D) Too lean mixture

120) The Permissible deflection in limit state of serviceability must NOT exceed —

A) 20 mm   B) 10 mm

c) 30 mm   D) 40 mm

$$\frac{Rl \cdot yl}{imc} = \frac{PLy}{y}$$

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