JEECUP 2020 A Question Paper

Time Allowed :2 Hours 30 Mins	**Maximum Marks :**400	**Total Questions :**100

General Instructions

Read the following carefully and follow them strictly:

1. The paper consists of **100 multiple-choice questions (MCQs)**. For each correct answer, **+4 marks** will be awarded, and for each incorrect answer,**-1 mark** will be deducted.
2. If a candidate fills more than one circle for a question, the answer will be considered **invalid**.
3. The OMR answer sheet instructions will be given separately. Follow these instructions carefully, and ensure that all entries and circles are filled with a **ballpoint pen**.
4. Candidates must follow all instructions given by the **Centre Superintendent, Invigilator, or Board Authorities**. Failure to do so, or engaging in misconduct, such as tearing the question paper, exchanging written materials, or assisting others, will result in cancellation of the exam.
5. The use of **log tables, electronic calculators, pagers, mobile phones, and slide rules** is strictly prohibited during the examination.
6. The answer sheet should be filled carefully with a **ballpoint pen**. Make sure to mark the correct answer, as no changes will be allowed once the circle is filled.
7. After the examination, candidates may keep the question paper, but the answer sheet should be submitted as per the instructions.

MATHEATICS

1. The volume of a cuboid is $x^3 - 7x + 6$, then the longest side of cuboid is
(A) $x + 3$
(B) None of these
(C) $x - 1$
(D) $x - 2$

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2. The Quadratic equation, whose roots are $\frac{4+\sqrt{7}}{2}$ and $\frac{4-\sqrt{7}}{2}$ is
(A) $4x^2 + 16x + 9 = 0$
(B) $4x^2 - 16x - 9 = 0$
(C) $4x^2 - 16x + 9 = 0$
(D) $4x^2 + 16x - 9 = 0$

3. The perpendicular distance between two parallel lines $3x + 4y - 6 = 0$ and $6x + 8y + 7 = 0$ is equal to
(A) 19/10 unit
(B) 19/5 unit
(C) 10/19 unit
(D) 19/2 unit

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4. The length of sides of a triangle are in the ratio $3 : 4 : 5$ and its perimeter is 144 cm. The area of triangle is
(A) 764 cm^2
(B) 684 cm^2
(C) 864 cm^2
(D) 664 cm^2

---

5. The volume of cylinder is 448π cm^3 and height 7 cm. Then its lateral surface area is
(A) None of these
(B) 259 cm^2
(C) 352 cm^2
(D) 252 cm^2

---

6. If $A = 4x + \frac{1}{x}$ then the value of $A + \frac{1}{A}$ is
(A) 1
(B) None of these
(C) $\frac{4x^2+1}{x}$
(D) $\frac{x}{4x^2+1}$

---

7. The earth makes a complete rotation about its axis in 24 h. What angle will it turn in 3 h 20 minutes ?
(A) None of these
(B) 50°
(C) 120°
(D) 130°

---

8. If side of cube is 6 cm, then the diagonal of cube is
(A) $6\sqrt{3}$ cm
(B) $2\sqrt{3}$ cm
(C) $6\sqrt{2}$ cm
(D) $3\sqrt{2}$ cm

---

9. The solution of equation $y^{\frac{2}{3}} - 2y^{\frac{1}{3}} = 15$ is
(A) $27, -125$
(B) $25, 27$
(C) $125, -27$
(D) $25, -27$

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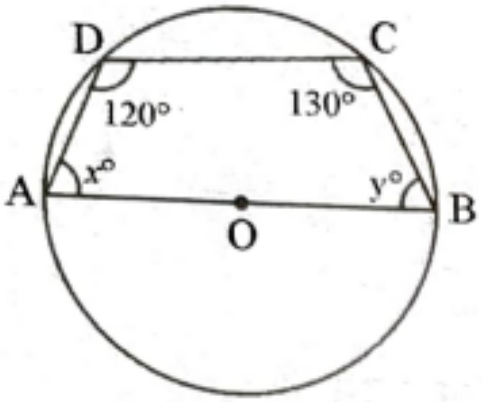
10. Use the following figure to find x° and y°



(A) $x = 50°, y = 30°$
(B) $x = 30°, y = 50°$
(C) $x = 50°, y = 60°$
(D) $x = 55°, y = 65°$

---

11. If $\sqrt{3}x - 2 = 2\sqrt{3} + 4$, then the value of x is
(A) $2(1 - \sqrt{3})$
(B) $1 + \sqrt{3}$
(C) $1 - \sqrt{3}$
(D) $2(1 + \sqrt{3})$

---

12. Vertex of a triangle are $(4, 6), (2, -2)$ and $(0, 2)$, then co-ordinates of its centroid must be

(A) $(2, 2)$
(B) $(-2, 2)$
(C) $(2, 3)$
(D) $(1, 2)$

---

13. Angles of a triangle are in ratio of $1 : 5 : 12$, biggest angle of this triangle is
(A) $45°$
(B) $90°$
(C) $120°$
(D) $60°$

---

14. The value of $(x - \frac{2}{x})(x^2 + 2 + \frac{4}{x^2})$ is
(A) $x^3 + 2x + \frac{4}{x} - 8$
(B) $x^3 - \frac{8}{x^3}$
(C) $x^3 + \frac{8}{x^3}$
(D) $x^3 - \frac{8}{x^2}$

---

15. A and B can do a piece of work in 72 days. B and C in 120 days and A and C in 90 days. In what time can A alone do it ?
(A) 120 days
(B) 55 days
(C) 110 days
(D) 60 days

---

16. If points $(5, 5), (10, k)$ and $(-5, 1)$ are collinear. Then the value of k is
(A) 9
(B) 6
(C) 8
(D) 7

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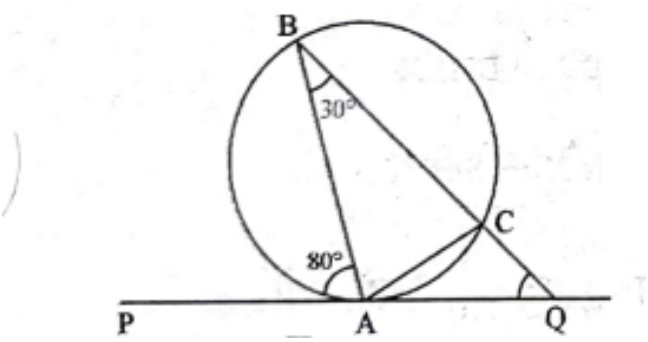
17. In figure $\angle BAP = 80°$ and $\angle ABC = 30°$, then $\angle AQC$ will be



(A) 65°
(B) 50°
(C) 110°
(D) 55°

---

18. If $\sin x + \sin^2 x = 1$, then the value of $\cos^2 x + \cos^4 x$ is
(A) -1
(B) 0
(C) 1
(D) 2

---

19. If $2^x = 5^y = 10^{-z}$, then the value of $(\frac{1}{x} + \frac{1}{y} + \frac{1}{z})$ is
(A) -2
(B) 0
(C) 5
(D) 3

---

20. The value of $X^{(\log y - \log z)} \times Y^{(\log z - \log x)} \times Z^{(\log x - \log y)}$
(A) 5
(B) 1
(C) 3
(D) 0

---

21. A train passes telegraph post in 40 seconds moving at a rate of 36 km/h. Then the length of the train is
(A) 450 m
(B) 500 m
(C) 400 m

(D) 395 m

---

22. The value of $\sqrt{\frac{1+\sin x}{1-\sin x}}$ is
(A) $\sec x + \tan x$
(B) $\sec x \cdot \tan x$
(C) $\sec x - \tan x$
(D) $\tan x - \sec x$

---

23. The perimeter of an equilateral triangle whose area is $4\sqrt{3}$ cm^2 is equal to
(A) 10 cm
(B) 12 cm
(C) 20 cm
(D) 15 cm

---

24. The value of $\log_5\left(\frac{1}{125}\right)$ is
(A) 0
(B) -3
(C) 3
(D) 5

---

25. If the ratio of volumes of two spheres is $1:8$, then the ratio of their surface areas is
(A) 1 : 4
(B) 1 : 6
(C) 1 : 8
(D) 1 : 2

---

26. If $5\sqrt{5} \times 5^3 \div 5^{-3/2} = 5^{a+2}$ then the value of a is
(A) 5
(B) 8
(C) 6
(D) 4

---

27. The factor of $(a^4b^4 - 16c^4)$ is
(A) $(a^2b^2 - 4c^2)(ab + 2c)^2$
(B) $4(a^2b^2 + c^2)(ab - 2c)(ab + 2c)$
(C) $(a^2b^2 - 4c^2)^2(ab + 2c)(ab + 4c)$
(D) $(a^2b^2 + 4c^2)(ab + 2c)(ab - 2c)$

---

28. Ravi can do 3/4 of a work in 12 days. In how many days Ravi can finish the 1/2 work ?
(A) 8 days
(B) 7 days
(C) 6 days
(D) None of these

---

29. The median of the following data 25, 34, 31, 23, 22, 26, 35, 29, 20, 32 is
(A) 29.5
(B) 27.5
(C) 30.5
(D) 22.5

---

30. If $\left(x + \frac{1}{x}\right) = \sqrt{3}$, then the value of $\left(x^3 + \frac{1}{x^3}\right)$ will be
(A) 0
(B) $3\sqrt{3}$
(C) $3(\sqrt{3} - 1)$
(D) $3(\sqrt{3} + 1)$

---

31. The area of circle whose circumference is equal to the perimeter of a square of side 11 cm is
(A) 144 cm^2
(B) 124 cm^2
(C) 154 cm^2
(D) 134 cm^2

---

32. $\tan 3A \cdot \tan 2A \cdot \tan A$ is equal to
(A) $\tan 3A - \tan 2A - \tan A$
(B) $\tan 3A + \tan 2A + \tan A$
(C) $\tan 3A \cdot \tan 2A - \tan A$

(D) None of these

---

33. If $\tan(A+B)=\sqrt{3}$ and $\cos(A-B)=\frac{\sqrt{3}}{2}$, the values of A and B are
(A) $45°, 15°$
(B) $15°, 30°$
(C) $40°, 20°$
(D) $60°, 30°$

---

34. Find equation of line passing through the two points $(3,5)$ and $(-4,2)$
(A) $3x-7y+26=0$
(B) $3x+7y+26=0$
(C) $7x-3y+26=0$
(D) $3x-7y+62=0$

---

35. The value of $\sqrt[3]{\frac{72.9}{0.4096}}$ is
(A) 5.265
(B) 5.652
(C) None of these
(D) 5.625

---

36. A Verandah of area 90 m^2 is around a room of length 15 m and breadth 12 m. The width of the Verandah is
(A) 2 m
(B) 1 m
(C) 1.5 m
(D) 2.5 m

---

37. If $\tan\theta+\sin\theta=m$ and $\tan\theta-\sin\theta=n$. Then the value of m^2-n^2 is
(A) 4 mn
(B) $\sqrt{mn}$
(C) $2\sqrt{mn}$
(D) $4\sqrt{mn}$

---

38. The value of $\cos 20^\circ \cos 70^\circ - \sin 20^\circ \sin 70^\circ$
(A) 1
(B) ∞
(C) None of these
(D) 0

---

39. The LCM of polynomials $p(x) = 4x^2(x^2 - 3x + 2)$ **and** $q(x) = 12x(x - 2)(x^2 - 4)$ **is**
(A) $12x^2(x^2 - 3x + 2)(x^2 + 4)$
(B) $12x^2(x^2 - 3x + 2)(x^2 - 4)$
(C) $x^2(x^2 - 3x + 2)(x^2 - 4)$
(D) $4x(x - 2)$

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40. Find the value of complementary angle of 75°
(A) 85°
(B) 15°
(C) 45°
(D) 30°

---

41. The value of $\frac{15}{\sqrt{10}+\sqrt{20}+\sqrt{40}-\sqrt{5}-\sqrt{80}}$
(A) $\sqrt{5}(1 + \sqrt{2})$
(B) $\sqrt{5}(5 + \sqrt{2})$
(C) $\sqrt{5}(2 + \sqrt{2})$
(D) $\sqrt{3}(3 + \sqrt{2})$

---

42. If 7 is the mean of 5, 3, 0.5, 4.5, a, 8.5, 9.5 then the value of 'a' is
(A) 49
(B) 31
(C) 12
(D) 18

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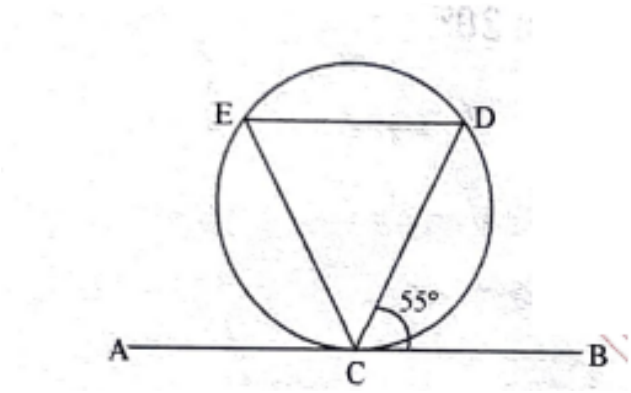
43. In the given figure, the value of $\angle DEC$ **is**



(A) 75°
(B) 65°
(C) 55°
(D) 45°

---

44. The sum of two numbers is 11 and their product is 30, then the numbers are
(A) 6, 5
(B) 9, 2
(C) 8, 3
(D) 7, 4

---

45. Two straight lines $3x - 2y = 5$ and $2x + ky + 7 = 0$ are perpendicular to each other. The value of k is
(A) 3
(B) 3
(C) 4/3
(D) 1/3

---

46. The L.C.M. of $12x^2y^3z^2$ and $18x^4y^2z^3$ is
(A) $36x^4y^3z^3$
(B) $32x^4yz^3$
(C) $21xyz$
(D) $24x^4y^2z^2$

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47. The value of $\tan 15^\circ$ is
(A) $2 - \sqrt{3}$
(B) 1
(C) $2/\sqrt{3}$

(D) $2+\sqrt{3}$

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48. The value of $\sin\theta + \cos(90+\theta) + \sin(180-\theta) + \sin(180+\theta)$ **is**
(A) 0
(B) -1
(C) 1/2
(D) 1

---

49. The value of expression $\log\frac{14}{15} - \log\frac{3}{25} - \log\frac{7}{9}$ **is**
(A) 0
(B) 2
(C) 3
(D) 1

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50. The compound interest on 24,000 for $1\frac{1}{2}$ **years at 10% per annum compounded semi-annually for**
(A) 3,583
(B) 3,783
(C) 3,780
(D) 3,774

PHYSICS

51. An object is placed in front of a convex lens of focal length 12 cm. If the size of the real image formed is half the size of the object, then the distance of object from the lens
(A) 48 cm
(B) 26 cm
(C) 30 cm
(D) 36 cm

---

52. The gravitational force between two masses kept at a certain distance is 'P' Newton. The same two masses are now kept in water and the distance between them are same. The gravitational force between these two masses in water is 'Q'

Newton then
(A) P ¡ Q
(B) P ¿ Q
(C) P = Q
(D) None of these

---

53. V_V, V_R, V_G **are the velocities of violet, red and green light respectively, in a glass prism. Which among the following is a correct relation ?**
(A) $V_V < V_G < V_R$
(B) $V_V > V_R > V_G$
(C) $V_V = V_R = V_G$
(D) $V_V < V_R < V_G$

---

54. A particle is moving along a circular track of radius 1 m with a uniform speed. The ratio of the distance covered and the displacement in half revolution is
(A) $2 : \pi$
(B) $\pi : 2$
(C) $\pi : 1$
(D) $1 : 1$

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55. A spherical mirror and a thin spherical lens each have a focal length of - 15 cm. Nature of mirror and lens will be
(A) Mirror convex and lens concave
(B) Both convex
(C) Mirror concave and lens convex
(D) Both concave

---

56. 100 joule of heat is produced each second in a 4 ohm resistance. Potential difference across the resistor
(A) 40 V
(B) 50 V
(C) 20 V
(D) 100 V

---

57. In a simple pendulum experiment, a student calculate the value of g is 9.92 m/s^2 but the standard value of g is 9.80 m/s^2 then the percentage error in the

calculation of g is
(A) 1.32%
(B) 1.12%
(C) 1.22%
(D) 1.42%

---

58. A ball is released from the top of a tower of height h meter. It takes T seconds to reach ground. What is the position of ball above the ground in T/5 seconds?
(A) 24 h m
(B) h / 25 m
(C) 25 h m
(D) $\frac{24}{25}h$ m

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59. An object 4.0 cm in size, is placed at 25 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image?
(A) - 37.5 cm
(B) - 35.5 cm
(C) + 25.5 cm
(D) + 25 cm

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60. A car of mass 2000 kg is moving with a velocity of 18 km/h. Work done to stop this car is
(A) 2.5×10^3 joule
(B) 2.5×10^4 joule
(C) 2.5×10^6 joule
(D) 2.5×10^5 joule

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61. A body weights 75 gm in air, 51 gm when completely immersed in unknown liquid and 67 gm when completely immersed in water. Find the density of the unknown liquid
(A) 4 gm/cm^3
(B) 6 gm/cm^3
(C) 3 gm/cm^3
(D) 8 gm/cm^3

---

62. Two unlike parallel forces 2 N and 16 N act at the ends of a uniform rod of 21 cm length. The point where the resultant of these two act is at a distance of _____ from the greater force.
(A) 1 cm
(B) 3 cm
(C) 4 cm
(D) 2 cm

---

63. The electric field strength at a point in an electric field is 30 N/C. Find the force experienced by a charge of 20 C at that point
(A) 300 N
(B) 600 N
(C) 20 N
(D) 30 N

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64. A wooden block of mass 6 kg is pulled across a rough surface by a 54 N force against a friction force F. The acceleration of the block is 6 m/s^2 then the value of friction force F is
(A) 18 N
(B) 54 N
(C) 36 N
(D) 9 N

---

65. If radius of Earth shrinks by 4% and mass of Earth unchanged, then the value of acceleration due to gravity will be changed by
(A) 8%
(B) 16%
(C) 2%
(D) 4%

---

66. A charge of 10 coulomb is brought from infinity to a point P near a charged body and in this process 200 joule of work is done. Electric potential at point P
(A) 100 V
(B) 20 V
(C) 200 V
(D) 10 V

---

67. Magnetic flux of a 20 round coil is reduced to zero from 0.3 weber in one second then the induced e.m.f. between the terminal of coil
(A) 2.5 V
(B) 6 V
(C) 3 V
(D) 1.5 V

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68. A sound wave has a frequency of 500 Hz and wavelength 80 cm. How long time will it take to travel 1 km ?
(A) 2.5 seconds
(B) 2.5 minutes
(C) 25 minutes
(D) 25 seconds

---

69. In an L-C-R circuit, 100 volt alternating voltage is applied between end points. In circuit inductive reactance is XL = 20 ohm, capacitance reactance is XC = 20 ohm and resistance is of 5 ohm. The impedance of circuit will be
(A) 15 ohm
(B) 45 ohm
(C) 20 ohm
(D) 5 ohm

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70. Two resistances combines in series order provide 50 ohm resultant resistance and when it combines in parallel order provides 8 ohm resultant resistance. The value of each resistance.
(A) 21 ohm and 29 ohm
(B) 10 ohm and 40 ohm
(C) 20 ohm and 30 ohm
(D) 15 ohm and 35 ohm

---

71. A stone is gently dropped from a height of 20m. If its velocity increases uniformly at the rate of $10\ \mathrm{m/s^2}$**. With what velocity and after what time will it strike the ground ?**
(A) 20 m/s, 20 s
(B) 10 m/s, 20 s
(C) 10 m/s, 2 s
(D) 20 m/s, 2 s

72. One proton enters in a magnetic field of 2500 N / Amp - m intensity with velocity of 4×10^5 m/sec in parallel of field. The force exerted on proton will be
(A) 4.8×10^{-10} N
(B) 0.48×10^{-10} N
(C) 0 N
(D) 4.8×10^{10} N

---

73. 100 gm of water at 60°C is added to 180 gm of water at 95°C. The resultant temperature of mixture is
(A) 82.5°C
(B) 77.5°C
(C) 80°C
(D) 85°C

---

74. The capacitance of a capacitor is 3μF. If 108μC charge is available in it, then what will be potential difference between plates ?
(A) 224 volt
(B) 324 volt
(C) 36 volt
(D) 24 volt

---

75. Heat (in calorie) required to increase the temperature from 10°C to 20°C of 6 kg copper is same as heat (in calorie) required to increase the temperature from 20°C to 100°C of 3 kg lead. If specific heat of copper is 0.09 then the specific heat of lead will be
(A) 0.022
(B) 0.033
(C) 0.055
(D) 0.044

CHEMISTRY

76. Amount of copper deposited on the cathode of an electrolytic cell containing copper sulphate solution by the passage of 2 amperes for 30 minutes - (At. mass of Cu = 63.5)

(A) 0.1184 gm
(B) 0.2214 gm
(C) 2.214 gm
(D) 1.184 gm

---

77. In which of the compound oxidation number of oxygen is +2 ?
(A) K_2O
(B) O_3
(C) Na_2O_2
(D) F_2O

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78. The number of molecules present in 2.8 g of nitrogen is
(A) 6.023×10^{20}
(B) 6.023×10^{22}
(C) 6.023×10^{21}
(D) 6.023×10^{23}

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79. In the following reaction $\mathbf{SO_2 + 2H_2S \longrightarrow 3S + 2H_2O}$
(A) Sulphur is reduced and oxygen is oxidised
(B) Sulphur is oxidised and Hydrogen is reduced
(C) Sulphur is both oxidised and reduced
(D) Hydrogen is oxidised and Sulphur is reduced

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80. Essential constituent of an amalgam is
(A) Mercury
(B) an alkali metal
(C) an alkali
(D) Silver

---

81. The half life period of a radioactive element is 150 days. After 600 days 1 gm of the element will be reduced to
(A) 1/16 gm
(B) 1/8 gm
(C) 1/32 gm
(D) 15/16 gm

82. Hardness of water is due to the presence of
(A) Sodium and Potassium salt
(B) Calcium and Magnesium salt
(C) Lead and copper salt
(D) None of these

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83. An organic compound contains carbon = 38.71%, Hydrogen = 9.67% and Oxygen. The empirical formula of the compound would be
(A) CH_4O
(B) CH_2O
(C) CHO
(D) CH_3O

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84. An example of thermosetting plastic is
(A) All of these
(B) Bakelite
(C) Polythylene
(D) P.V.C.

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85. Electronic configuration of copper can be represented as
(A) $[Ar]4s^2 3d^9 4p^1$
(B) $[Ar]4s^2 3d^9$
(C) $[Ar]4s^2 3d^{10} 4p^1$
(D) $[Ar]4s^1 3d^{10}$

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86. Among the following, ionic hydride is
(A) BH_3
(B) SiH_4
(C) PH_3
(D) MgH_2

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87. Which catalyst is used in oxidizing NH_3 in Ostwald's process?
(A) FeO
(B) Pt

(C) Molybdenum
(D) V_2O_5

---

88. Which among the following pairs are not having same number of total electrons?
(A) O^{2-} and F^-
(B) P^{-3} and Ar
(C) Na^+ and Al^{3+}
(D) Mg^{2+} and Ar

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89. Equivalent weight of a dibasic acid is 12. Its molecular weight is
(A) 24
(B) 12
(C) 6
(D) 48

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90. Hydrocarbon used for welding purpose is
(A) Ethyne
(B) Benzene
(C) Ethene
(D) Ethane

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91. Which of the following order of ionic radii is correctly represented ?
(A) $H^- > H^+ > H$
(B) $Na^+ > F^- > O^{2-}$
(C) $F^- > O^{2-} > Na^+$
(D) $Al^{3+} < Mg^{2+} < N^{3-}$

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92. 10.0 gm $CaCO_3$ on heating gave 5.6 gm of CaO and 4.4 gm of CO_2, given data support the law of
(A) Multiple proportion
(B) Constant proportion
(C) Law of conservation of mass
(D) All of these

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93. Cracking is a process used for change in
(A) Ketones to aldehydes
(B) Alcohols to aldehydes
(C) Alkanes to aromatic hydrocarbons
(D) Higher molecular weight alkane to lower molecular weight alkane

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94. Which of the following types drugs reduces fever ?
(A) Tranquilizers
(B) Antibiotic
(C) Analgesic
(D) Antipyretic

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95. $F_2C = CF_2$ is a monomer of
(A) Teflon
(B) Buna-S
(C) Nylon-6
(D) Glyptol

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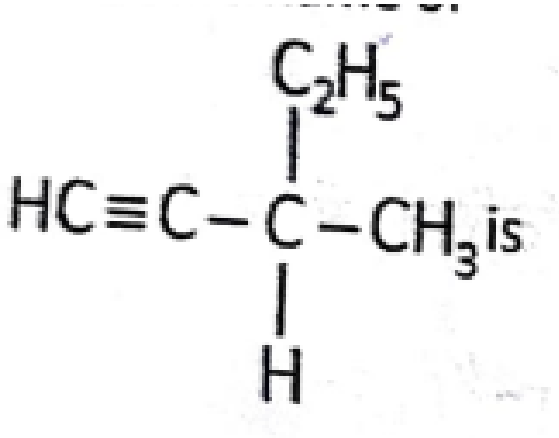
96. The IUPAC name of



(A) 3-Methyl-1-Pentyne
(B) 3-Methyl-4-Pentyne
(C) 2-Ethyl-2-Propyne
(D) 3-Methyl-5-Pentyne

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97. Detergents are the salt of
(A) Carboxylic acid and Sulphonic acids or alkyl hydrogen sulphates both

(B) An alkali metal
(C) Sulphonic aml ya alkyl hydrogen sulphate (Sulphonic acid or alkyl hydrogen sulphate)
(D) Carboxylic acid

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98. The common name of 2-Butanone is
(A) Acetone
(B) Butyraldehyde
(C) Acetic anhydride
(D) Ethyl Methyl Ketone

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99. Real gas behaves like ideal gas at
(A) High temperature
(B) High pressure
(C) Low temperature
(D) None of these

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100. The rate of diffusion of a gas is r and its density is d, then under similar conditions of pressure and temperature
(A) $r \propto d$
(B) $r \propto \frac{1}{\sqrt{d}}$
(C) $r \propto \sqrt{d}$
(D) $r \propto \frac{1}{d}$
