HORIZON ACADEMY®

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Name.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Date : 06/09/2015

Test No.: 0 4

Subject Code.: 1 1 1

Time : 3 Hrs. **M.M. : 360**

HORIZON TEST SERIES

for

Engineering Entrance Exam.

2016

[Test No. 4]

INSTRUCTIONS FOR STUDENTS

1. Read each question carefully.
2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should complete fill the circle.
4. Rough work must not be done on the Question Paper, no additional sheet will be provided for this purpose.
5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.
6. Student cannot use log tables and calculators or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Each correct answer carries four marks. One mark will be deducted for each incorrect answer from the total score.
9. Before handing over the answer sheet to the invigilator, candidate should check the particulars have been filled and marked correctly.
10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.
11. Use of Calculator and other Electronic device is not permitted.

Test No. 4

Topics of The Test

Physics	Unit, Dimension, Errors & Motion in 1D.
Chemistry	Atomic Structure & Classification of Elements.
Maths	Permutations and combinations.

Test No. 4

[PHYSICS]

1. The constant of proportionality $\frac{1}{4\pi\varepsilon_0}$ in Coulomb's law has the following units
   (A) $C^{-2}Nm^2$ (B) $C^2N^{-1}m^{-2}$
   (C) C^2Nm^2 (D) $C^{-2}N^{-1}m^{-2}$
2. 1 ns is defined as
   (A) 10^{-9} s of Kr-clock of 1650763.73 oscillations
   (B) 10^{-9} s of Kr-clock of 6521389.63 oscillations
   (C) 10^{-9} s of Cs-clock of 1650763.73 oscillations
   (D) 10^{-9} s of Cs-clock of 9192631770 oscillations
3. How many wavelengths of the Kr^{89} are there in one metre ?
   (A) 658189.63 (B) 2348123.73
   (C) 1650763.73 (D) 1553164.12
4. The dimensions of potential are the same as that of
   (A) work
   (B) electric field per unit charge
   (C) work per unit charge
   (D) force per unit charge
5. Which one of the following pair of quantities has same dimension ?
   (A) Force and work done
   (B) Momentum and impulse
   (C) Pressure and force
   (D) Surface tension and stress
6. The dimensions of magnetic field in M, L, T and C (coulomb) is given as
   (A) $[MLT^{-1}C^{-1}]$ (B) $[MT^2C^{-2}]$
   (C) $[MT^{-1}C^{-1}]$ (D) $[MT^{-2}C^{-1}]$
7. The air bubble formed by explosion inside water performed oscillation with time period T that is directly proportional to $p^a d^b E^c$, where p is the pressure, d is the density and E is the energy due to explosion. The values of a, b and c will be
   (A) –5/6, 1/2, 1/3 (B) 5/6, 1/3, 1/2
   (C) 5/6, 1/2, 1/3 (D) None of these
8. In the relation $p = \frac{\alpha}{\beta} e^{-\frac{\alpha z}{k\theta}}$, p is the pressure, z the distance, k is Boltzmann constant and θ is the temperature, the dimensional formula of β will be
   (A) $[M^0L^2T^0]$ (B) $[ML^2T]$
   (C) $[ML^0T^{-1}]$ (D) $[ML^2T^{-1}]$
9. The frequency f of vibration of mass m suspended from a spring of spring constant k is given by
   $$f = cm^x k^y$$
   where c is dimensionless constant. The values of x and y are respectively
   (A) 1/2, 1/2 (B) –1/2, 1/2
   (C) 1/2, –1/2 (D) –1/2, –1/2
10. Find the dimensions of electric permittivity
    (A) $[A^2M^{-1}L^{-3}T^4]$ (B) $[A^2M^{-1}L^{-3}T^0]$
    (C) $[AM^{-1}L^{-3}T^4]$ (D) $[A^2M^0L^{-3}T^4]$
11. Position of a body with acceleration a is given by $x = ka^m t^n$. Here t is time. Find the dimensions of m and n
    (A) $m = 1, n = 1$ (B) $m = 1, n = 2$
    (C) $m = 2, n = 1$ (D) $m = 2, n = 2$

Space for Rough Work

12. In the gas equation $\left(p+\frac{a}{V^2}\right)(V-b)=RT$, the dimensions of a are
(A) $[ML^3T^{-2}]$ (B) $[M^{-1}L^3T^{-1}]$
(C) $[ML^5T^{-2}]$ (D) $[M^{-1}L^{-5}T^2]$

13. The dimension of k in the equation $W=\frac{1}{2}kx^2$ is
(A) $[ML^0T^{-2}]$ (B) $[M^0LT^{-1}]$
(C) $[MLT^{-2}]$ (D) $[ML^0T^{-1}]$

14. If 3.8×10^{-6} is added to 4.2×10^{-5} giving due regard to significant figures, then the result will be
(A) 4.58×10^{-5} (B) 4.6×10^{-5}
(C) 4.5×10^{-5} (D) None of the above

15. A student performs an experiment for determination of $g\left(=\frac{4\pi^2 l}{T^2}\right), l\approx 1\,\text{m}$, and he commits an error of Δl. For T he takes the time of n oscillations with the stop watch of least count ΔT and he commits a human error of 0.1 s. For which of the following data, the measurement of g will be most accurate ?
(A) $\Delta L=0.5, \Delta T=0.1, n=20$
(B) $\Delta L=0.5, \Delta T=0.1, n=50$
(C) $\Delta L=0.5, \Delta T=0.01, n=20$
(D) $\Delta L=0.1, \Delta T=0.05, n=50$

16. A body is falling freely under gravity. The distances covered by the body in first, second and third minute of its motion are in the ratio
(A) 1 : 4 : 9 (B) 1 : 2 : 3
(C) 1 : 3 : 5 (D) 1 : 5 : 6

17. A person moves 30 m north and then 20 m towards east and finally $30\sqrt{2}$ m in south-west direction. The displacement of the person from the origin will be
(A) 10 m along north (B) 10 m along south
(C) 10 m along west (D) zero

18. The position of a particle x (in metre) at a time t second is given by the relation $r=(3t\hat{\mathbf{i}}-t^2\hat{\mathbf{j}}+4\hat{\mathbf{k}})$. Calculate the magnitude of velocity of the particle after 5 s.
(A) 3.55 m/s (B) 5.03 m/s
(C) 8.75 m/s (D) 10.44 m/s

19. A body starts from rest with uniform acceleration. If its velocity after n second is v, then its displacement in the last 2 s is
(A) $\frac{2v(n+1)}{n}$ (B) $\frac{v(n+1)}{n}$
(C) $\frac{v(n-1)}{n}$ (D) $\frac{2v(n-1)}{n}$

20. A body of mass m moving along a straight line covers half the distance with a speed of 2ms^{-1}. The remaining half of distance is covered in two equal time intervals with a speed of 3 ms^{-1} and 5 ms^{-1} respectively. The average speed of the particle for the entire journey is
(A) $\frac{3}{8}\text{ms}^{-1}$ (B) $\frac{8}{3}\text{ms}^{-1}$
(C) $\frac{4}{3}\text{ms}^{-1}$ (D) $\frac{16}{3}\text{ms}^{-1}$

21. The numerical ratio of average velocity to average speed is
(A) always less than one
(B) always equal to one
(C) always more than one
(D) equal to or less than one

22. A body of mass m is thrown upwards at an angle θ with the horizontal with velocity v. While rising up the velocity of the mass after t second will be
(A) $\sqrt{(v\cos\theta)^2+(v\sin\theta)^2}$
(B) $\sqrt{(v\cos\theta-v\sin\theta)^2-gt}$
(C) $\sqrt{v^2+g^2t^2-(2v\sin\theta)gt}$
(D) $\sqrt{v^2+g^2+g^2-(2v\cos\theta)gt}$

Space for Rough Work

23. Two bodies of different masses are dropped from heights of 16 m and 25 m respectively. The ratio of the time taken by them to reach the ground is

(A) $\frac{25}{16}$ (B) $\frac{5}{4}$

(C) $\frac{4}{5}$ (D) $\frac{16}{25}$

24. Two balls of same size but the density of one is greater than that of the other are dropped from the same height, then which ball will reach the earth first (air resistance is negligible) ?

(A) Heavy ball
(B) Light ball
(C) Both simultaneously
(D) Will depend upon the density of the balls

25. A particle starts from rest and experiences constant acceleration for 6 s. If it travels a distance d_1 in the first two second, a distance d_2 in the next two seconds and a distance d_3 in the last two second, then

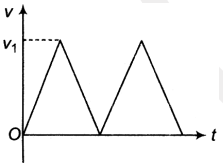
(A) $d_1 : d_2 : d_3 = 1:1:1$

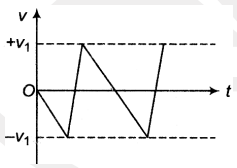
(B) $d_1 : d_2 : d_3 = 1:2:3$

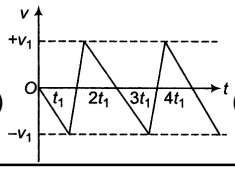
(C) $d_1 : d_2 : d_3 = 1:3:5$

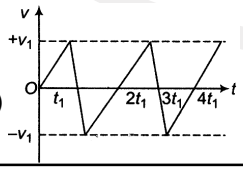
(D) $d_1 : d_2 : d_3 = 1:5:9$

26. Consider a rubber ball freely falling from a height h = 4.9 m onto a horizontal elastic plate. Assume that the duration of collision is negligible and the collision with the plate is totally elastic. Then the velocity as a function of time will be

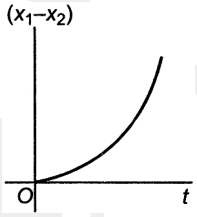
(A) 

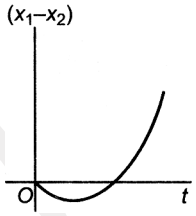
(B) 

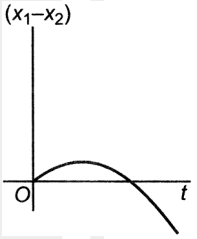
(C) 

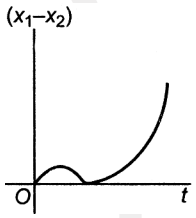
(D) 

27. A body is at rest at x = 0. At t = 0, it starts moving in the positive x-direction with a constant acceleration. At the same instant another body passes through x = 0 moving in the positive x-direction with a constant velocity. The position of the first body is given by $x_1(t)$ after time t and that of the second body by $x_2(t)$ after the same time interval. Which of the following graphs correctly describes $(x_1 - x_2)$ as a function of time t ?

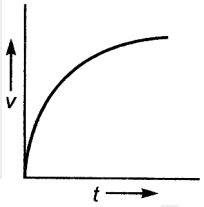
(A) 

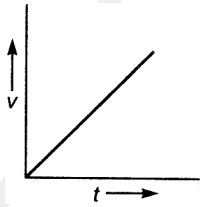
(B) 

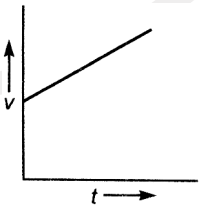
(C) 

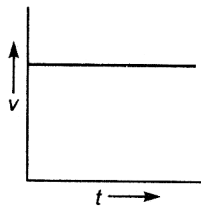
(D) 

28. A body starts from rest and moves with uniform acceleration. Which of the following graphs represents in motion ?

(A) 

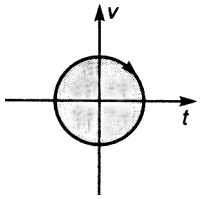
(B) 

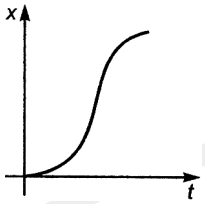
(C) 

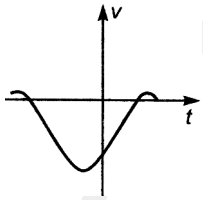
(D) 

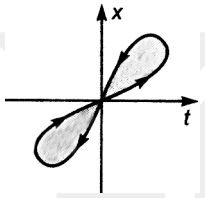
Space for Rough Work

29. Look at the graph (A) to (D) carefully and indicate which of these possibly represents one dimensional motion of a particle ?

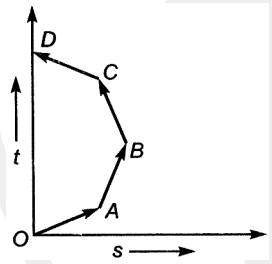
(A) 

(B) 

(C) 

(D) 

30. Which of the following options is correct for the object having a straight line motion represented by the following graph ?



(A) The object moves with constantly increasing velocity form O to A and then it moves with constant velocity.

(B) Velocity of the object increases uniformly

(C) Average velocity is zero

(D) The graph shown is impossible

[CHEMISTRY]

31. An isobar of $_{20}Ca^{40}$ is

(A) $_{18}Ar^{40}$ (B) $_{20}Ca^{38}$

(C) $_{20}Ca^{42}$ (D) $_{18}Ar^{38}$

32. Which of the following is correct ?

(A) $_{1}H^{1}$ and $_{2}He^{3}$ are isotopes

(B) $_{6}C^{14}$ and $_{7}N^{14}$ are isotopes

(C) $_{19}K^{39}$ and $_{20}Ca^{40}$ are isotones

(D) $_{9}F^{19}$ and $_{11}Na^{24}$ are isodiaphers

33. Particle nature of electron was experimently demonstrated by

(A) Max Bon (B) J.J. Thomson

(C) de-Broglie (D) Schrondinger

34. The work function (Φ) of some metals is listed below. The number of metals which will show photoelectric effect when light of 300 nm wavelength falls on the metal is :

Metal	Li	Na	K	Mg	Cu	Ag	Fe	Pt	W
ϕ(eV)	2.4	2.3	2.2	3.7	4.8	4.3	4.7	6.3	4.75

(A) 2 (B) 4

(C) 6 (D) 8

35. The energy of an electron in first Bohr orbit of H-atom is –13.6 eV. The possible energy value of electron in the excited state of Li^{2+} is

(A) –122.4 eV (B) 30.6 eV

(C) –30.6 eV (D) 13.6 eV

36. What is the lowest energy of the spectral line emitted by the hydrogen atom in the Lyman series ? (h = Planck's constant, c = velocity of light, R = Rydberg's constant).

(A) $\frac{5hcR}{36}$ (B) $\frac{4hcR}{3}$

(C) $\frac{3hcR}{4}$ (D) $\frac{7hcR}{144}$

Space for Rough Work

37. For a Bohr atom angular momentum M of the electron is (n = 0,1,2,....)

(A) $\frac{nh^2}{4\pi}$ (B) $\frac{n^2h^2}{4\pi}$

(C) $\frac{\sqrt{\pi h^2}}{4\pi}$ (D) $\frac{nh}{2\pi}$

38. The Bohr's orbit radius for the hydrogen atom (n = 1) is approximately 0.53 Å. The radius for the first excited state (n = 2) orbit is

(A) 0.27 Å (B) 1.27Å

(C) 2.12 Å (D) 3.12 Å

39. The first emission line in the electronic spectrum of hydrogen in the Balmer series appears at cm^{-1}

(A) $\frac{9R}{400}\,cm^{-1}$ (B) $\frac{7R}{144}\,cm^{-1}$

(C) $\frac{3R}{4}\,cm^{-1}$ (D) $\frac{5R}{36}\,cm^{-1}$

40. A body of mass 10 mg is moving with a velocity of 100 ms^{-1}. The wavelength of de-Broglie wave associated with it would be

(h = 6.63×10^{-34}Js)

(A) 6.63×10^{-35} m (B) 6.63×10^{-34} m

(C) 6.63×10^{-31} m (D) 6.63×10^{-37} m

41. Uncertainty in the position of an electron (mass = 9.1×10^{-31}kg) moving with a velocity 300 ms^{-1}, accurate upon 0.001% will be

(h = 6.63×10^{-34}Js)

(A) 19.2×10^{-2} m (B) 5.76×10^{-2} m

(C) 1.92×10^{-2} m (D) 3.84×10^{-2} m

42. Which of the following sets of quantum numbers is correct for an electron in 4*f*-orbital ?

(A) $n=4, l=3, m=+4, s=+1/2$

(B) $n=4, l=4, m=-4, s=-1/2$

(C) $n=4, l=3, m=+1, s=+1/2$

(D) $n=3, l=2, m=-2, s=+1/2$

43. The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{l(l+1)}\,\frac{h}{2\pi}$. This momentum for an *s*-electron will be given by

(A) $+\frac{1}{2}\cdot\frac{h}{2\pi}$ (B) zero

(C) $\frac{h}{2\pi}$ (D) $\sqrt{2}\cdot\frac{h}{2\pi}$

44. The electronic configuration of Cr^{3+} is

(A) $[Ar]3d^4 4s^2$ (B) $[Ar]3d^3 4s^0$

(C) $[Ar]3d^2 4s^1$ (D) $[Ar]3d^5 4s^1$

45. The observation that the ground state of nitrogen atom has 3 unpaired electrons in its electronic configuration and not otherwise is associated with

(A) Pauli's exclusion principle

(B) Hund's rule of maximum multiplicity

(C) Heisenberg's uncertainty relation

(D) Ritz combination principle

46. The element with atomic number 117 if discovered would be placed in

(A) noble gas family

(B) alkali family

(C) alkaline earth family

(D) halogen family

47. What is the name of element with atomic number 105?

(A) Kurchatovium (B) Dubnium

(C) Nobelium (D) Holmium

48. Identify the transition element.

(A) $1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^2$

(B) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^2, 4s^2$

(C) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}, 4s^2 4p^2$

(D) $1s^2, 2s^2 2p^6, 3s^2 3p^6 3d^{10}, 4s^2 4p^1$

Space for Rough Work

49. Which of the following statements is wrong ?
(A) The stability of hydrides increases from NH_3 to BiH_3 in group 15 of the Periodic Table.
(B) Nitrogen cannot form $d\pi - p\pi$ bond.
(C) Single N — N bond is weaker than the single P — P bond.
(D) N_2O_4 has two resonance structure.

50. The correct sequence which shows decreasing order of the ionic radii of the elements is
(A) $Al^{3+}>Mg^{2+}>Na^{+}>F^{-}>O^{2-}$
(B) $Na^{+}>Mg^{2+}>Al^{3+}>O^{2-}>F^{-}$
(C) $Na^{+}>F^{-}>Mg^{2+}>O^{2-}>Al^{3+}$
(D) $O^{2-}>F^{-}>Na^{+}>Mg^{2+}>Al^{3+}$

51. The ions O^{2-}, F^{-}, Na^{+}, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show
(A) a decrease from O^{2-} to F^{-} and then increase from Na^{+} to Al^{3+}
(B) a significant increase from O^{2-} to Al^{3+}
(C) a significant decrease from O^{2-} to Al^{3+}
(D) an increase from O^{2-} to F^{-} and then decrease from Na^{+} to Al^{3+}

52. The electron afinity values (in kJ mol^{-1}) of three halogens X, Y and Z are respectively –349, –333 and –325. Then, X, Y and Z respectively, are
(A) F_2, Cl_2 and Br_2 (B) Cl_2, F_2 and Br_2
(C) Cl_2, Br_2 and F_2 (D) Br_2, Cl_2 and F_2

53. The electronic configuration of the element with maximum electron affinity is
(A) $1s^2, 2s^2, 2p^3$
(B) $1s^2, 2s^2, 2p^5$
(C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^5$
(D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$

54. The electronic configurations of four elements are given below. Arrange these elements in the correct order of the magnitude (without sign) of their electron affinity.
(i) $2s^2 2p^5$ (ii) $3s^2 3p^5$
(iii) $2s^2 2p^4$ (iv) $3s^2 3p^4$
Select the correct answer using the codes given below
(A) (i)<(ii)<(iv)<(iii) (B) (ii)<(i)<(iv)<(iii)
(C) (i)<(iii)<(iv)<(ii) (D) (iii)<(iv)<(i)<(ii)

55. The element having highest electron affinity is
(A) bromine (B) iodine
(C) fluorine (D) Chlorine

56. One mole of magnesium in the vapour state absorbed 1200 $kJmol^{-1}$ of energy. If the first and second ionisation energies of Mg are 750 and 1450 $kJmol^{-1}$ respectively, the final composition of the mixture is
(A) 31%Mg^{+} + 69%Mg^{2+}
(B) 69%Mg^{+} + 31%Mg^{2+}
(C) 86%Mg^{+} + 14%Mg^{2+}
(D) 14%Mg^{+} + 86%Mg^{2+}

57. The order of first ionisation energies of the elements Li, Be, B, Na is
(A) Li>Be>B>Na (B) Be>B>Li>Na
(C) Na>Li>B>Be (D) Be>Li>B>Na

58. Among, Al_2O_3, SiO_2, P_2O_3 and SO_2 the correct order of acid strength is
(A) $SO_2<P_2O_3<SiO_2<Al_2O_3$
(B) $SiO_2<SO_2<Al_2O_3<P_2O_3$
(C) $Al_2O_3<SiO_2<SO_2<P_2O_3$
(D) $Al_2O_3<SiO_2<P_2O_3<SO_2$

59. A sudden large jump between the values of first and second ionisation energies of elements would be associated with which of the following electronic configurations ?
(A) $1s^2, 2s^2 2p^6, 3s^1$
(B) $1s^2, 2s^2 2p^6, 3s^2 3p^1$
(C) $1s^2, 2s^2, 2p^6, 3s^1 3p^2$
(D) $1s^2, 2s^2 2p^6, 3s^2$

60. In the Periodic Table metallic character of elements shows one of the following trend
(A) decreases down the group and increases across the period
(B) increases down the group and decreases across the period
(C) increases across the period and also down the group
(D) decreases across the period and also down the group

Space for Rough Work

[MATHEMATICS]

61. The remainder when $1!+2!+3!+\cdots+n!$ is divided by 5 is (given that $n \geq 4$)

(A) 1 (B) 2

(C) 3 (D) 4

62. The number of different words which can be formed from the letters of the word LUCKNOW when the vowels always occupy even places is

(A) 120 (B) 720

(C) 400 (D) None of these

63. Number of permutations of letters *a, b, c, d, e, f, g* taken all together if neither 'beg' nor 'cad' pattern appears is

(A) $7!-2.5!+3!$ (B) $7!-2.5!-3!$

(C) $7!-.5!+3!$ (D) None of these

64. Total number of 5 digit numbers having all different digits and divisible by 4 that can be formed using the digits {1, 3, 2, 6, 8, 9} is equal to

(A) 192 (B) 32

(C) 1152 (D) 384

65. A 5 digit number divisible by 3 is to be formed using the digits 0, 1, 2, 3, 4 and 5 without repetition. The total number of ways in which this can be done is

(A) 216 (B) 600

(C) 240 (D) 3125

66. The sum of all 4 digit numbers that can be formed by using the digits 2, 4, 6, 8 (repetition of digits not allowed) is

(A) 133320 (B) 533280

(C) 53328 (D) None of these

67. Number of ways in which a lawn-tennis mixed double be made from 7 married couples if no husband and wife play in the same set is

(A) 240 (B) 420

(C) 720 (D) None of these

68. A father with 8 children takes 3 at a time to the zoological garden as he can, without taking the same 3 children together more than once. Then, number of times each child will go is

(A) 56 (B) 36

(C) 21 (D) 28

69. In a class tournament, all participants were to play one game with each other; 2 players fell ill after having played 3 games each. If total number of games played in the tournament is equal to 84, then total number of participants in the beginning was equal to

(A) 10 (B) 15

(C) 12 (D) 14

70. The maximum number of points of intersection of 5 lines and 4 circles is

(A) 60 (B) 72

(C) 62 (D) None of these

71. Number of ways in which 16 constables can be assigned to patrol 8 villages, 2 for each is

(A) $\frac{(16)!}{8!(2!)^8}$ (B) $\frac{(16)!}{(2!)^8}$

(C) $\frac{(16)!}{(8!)^2}$ (D) None of these

72. Total number of divisors of 480 that are of the form $4n+2, n \geq 0$ is equal to

(A) 2 (B) 3

(C) 4 (D) None of these

73. The value of ${}^{50}C_4 + \sum_{r=1}^{6} {}^{56-r}C_3$ is

(A) ${}^{56}C_3$ (B) ${}^{56}C_4$

(C) ${}^{55}C_4$ (D) ${}^{55}C_3$

Space for Rough Work

74. The number of ways that 8 beads of different colours be strung as a necklace is

(A) 2520 (B) 2880

(C) 5040 (D) 4320

75. The number of distinct rational numbers x such that $0 < x < 1$ and $x = p/q$, where $p, q \in \{1,2,3,4,5,6\}$ is.

(A) 15 (B) 13

(C) 12 (D) 11

76. The number of possible outcomes in a throw of n ordinary dice in which at least one of the dice shows an odd number is

(A) $6^n - 1$ (B) $3^n - 1$

(C) $6^n - 3^n$ (D) None of these

77. The total number of flags with three horizontal strips, in order, that can be formed using 2 identical red, 2 identical green and 2 identical white strips, is equal to

(A) 4! (B) 3. (4!)

(C) 2. (4!) (D) None of these

78. In an examination of 9 papers, a candidate has to pass in more papers than the number of papers in which he fails in order to be successful. The number of ways in which he can be unsuccessful is

(A) 255 (B) 256

(C) 193 (D) 319

79. There are 4 letters and 4 directed envelopes. The number of ways in which all the letters can be put in the wrong envelope is

(A) 8 (B) 9

(C) 16 (D) None of these

80. The number of ways in which 12 books can be put in 3 shelves, 4 on each, is

(A) $12!/(4!)^3$ (B) $12!/[(3!)(4!)^3]$

(C) $21!/[(3!)^3 4!]$ (D) None of these

81. The total number of ways of selecting 10 balls out of an unlimited number of identical white, red and blue balls is equal to

(A) ${}^{12}C_2$ (B) ${}^{12}C_3$

(C) ${}^{10}C_2$ (D) ${}^{10}C_3$

82. A student is to answer 10 out of 13 questions in an examination such that he must choose at least 4 from the first 5 questions. The number of choices available to him is

(A) 196 (B) 280

(C) 346 (D) 140

83. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order ?

(A) 120 (B) 240

(C) 360 (D) 480

84. At an election, a voter may vote for any number of candidates, not greater than the number to be elected. There are 10 candidates and 4 are to be elected. If a voter votes for at least one candidate, then the number of ways in which he can vote is

(A) 5040 (B) 6210

(C) 385 (D) 1110

85. Let T_n denote the number of triangles which can be formed using the vertices of a regular polygon of n sides. If $T_{n+1} - T_n = 21$, then n equals

(A) 5 (B) 7

(C) 6 (D) 4

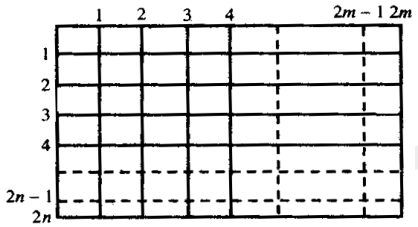
86. On a railway route there are 15 stations. The numbers of tickets required in order that it may be possible to book a passenger from every station to every other is

(A) $15!/2!$ (B) $15!$

(C) $15!/13!$ (D) $15!/(13!2!)$

Space for Rough Work

87. A rectangle with sides $2m-1$ and $2n-1$ is divided into squares of unit length by drawing parallel lines as shown in the diagram, then the number of rectangles possible with odd side length is



(A) $(m+n-1)^2$ (B) 4^{m+n-1}

(C) m^2n^2 (D) $m(m+1)\,n(n+1)$

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Question Nos. 88 to 90 All the letters of the word 'ARRANGE' are permuted.

88. Number of permutations if the two R's are never together is
(A) 840 (B) 960
(C) 900 (D) None of these

89. Number of permutations if the two A's are together but the two R's are not
(A) 280 (B) 240
(C) 300 (D) None of these

90. Number of permutations if neither two A's nor two R's are together is
(A) 720 (B) 600
(C) 540 (D) 660

Space for Rough Work

Space for Rough Work