

CITDEE-2014

SERIAL NO:

## TEST BOOKLET

DURATION: 03.00 HRS

MAXIMUM MARKS: 125

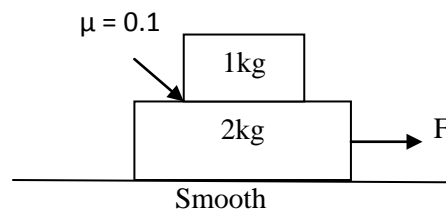
Read the following instructions carefully:

1. This Test Booklet contains **125 “Multiple Choice”** questions in four (4) sections: **A, B, C and D. Section-A: Physics (Q.1-25), Section-B: Chemistry (Q.26-50), Section-C: Mathematics (Q. 51-100), Section-D: English (Q.101-125).** All Questions carry equal marks of one (1) mark each.
2. Attempt all questions. Each question has only one option as correct answer (A, B, C or D)
3. Answer the questions by darkening the bubble corresponding to appropriate answer (**A, B, C or D**) on a separate **Optical Response Sheet (ORS)**
4. There will be no negative marking for the wrong answers. However, darkening must be done properly as given in the instructions in the answer sheet. More than one mark shall be treated as wrong answer.
5. Mobile phones, calculators or any other electronic gadgets are prohibited in the Examination Hall.
6. All rough works should be done in the space provided in the Test Booklet.
7. Candidates cannot leave the Examination Hall within the first hour from its commencement.
8. Candidates are not allowed to take this Test Booklet out of the Examination Hall during and after the Examination.
9. This Test Booklet contains **16** printed pages including cover page. Please check and report to the invigilator in case any page is missing, printing errors or other discrepancies are found.
10. Write your Roll No. and Name in the box provided below.

<b>Roll No</b>	
<b>Name</b>	

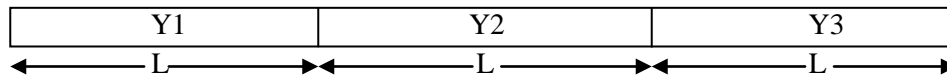
**SECTION-A: PHYSICS (Q. 1 – 25)**

- Which of the following statement is true?  
 [A] Accuracy of a measurement is a measure of how close the measured value is to the true value of the quantity.  
 [B] Precision is the extent to what resolution or limit the quantity is measured.  
 [C] An accurate reading of measurement may not be so precise and vice-versa.  
 [D] All of the above
- In successive measurement of the period of oscillation of a simple pendulum, the readings of oscillation turn out to be 2.63 s, 2.46 s, 2.71 s and 2.80 s. What will be the percentage error of the measured value?  
 [A] 3%                      [B] 4%                      [C] 5%                      [D] 6%
- Given  $\vec{A} = 2\hat{i} + 3\hat{j}$  and  $\vec{B} = \hat{i} + \hat{j}$ . The component of  $\vec{A}$  along vector  $\vec{B}$  is  
 [A]  $\frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$             [B]  $\frac{3}{\sqrt{2}}(\hat{i} + \hat{j})$             [C]  $\frac{5}{\sqrt{2}}(\hat{i} + \hat{j})$             [D]  $\frac{7}{\sqrt{2}}(\hat{i} + \hat{j})$
- The distance  $x$  covered by a body moving in a straight line in time  $t$  is given by.  $x^2 = t^2 + 2t + 3$ . The acceleration of the body vary as  
 [A]  $\frac{1}{x}$                       [B]  $\frac{1}{x^2}$                       [C]  $\frac{1}{x^3}$                       [D]  $\frac{1}{x^4}$
- For which of the following pairs of angles, the horizontal range of a projectile would be same?  
 [A]  $30^\circ, 50^\circ$             [B]  $40^\circ, 80^\circ$             [C]  $50^\circ, 75^\circ$             [D]  $31^\circ, 59^\circ$
- To increase the magnifying power of a telescope, the focal length of the  
 [A] Objective lens should be increased.  
 [B] Objective lens should be decreased.  
 [C] Eye piece lens should be increased.  
 [D] Eye piece lens should be decreased.
- A force of  $F = 0.5N$  is applied on lower block as shown in figure. The work done by lower block on upper blocks for a displacement of 3 m of the upper block with respect to ground is [take  $g = 10 \text{ ms}^{-2}$ ]

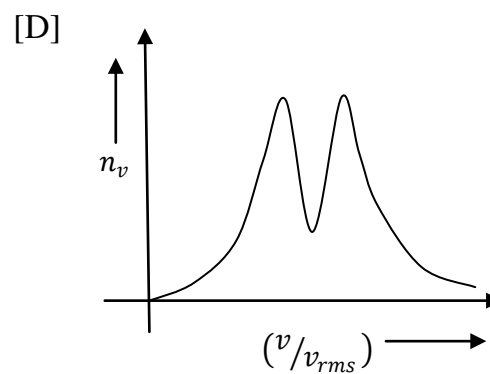
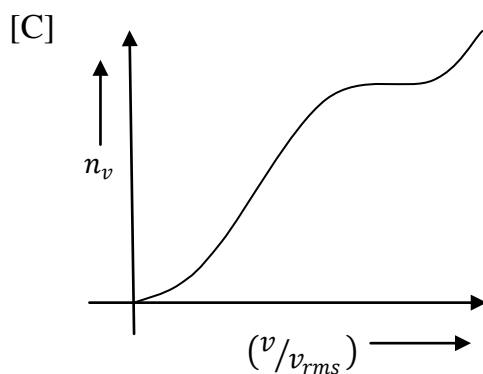
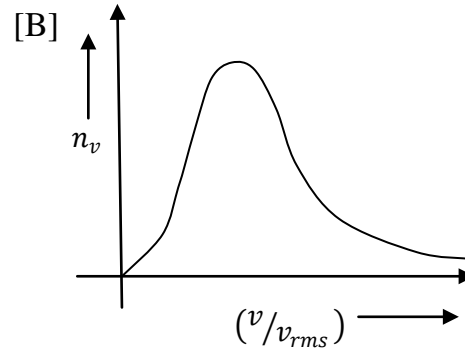
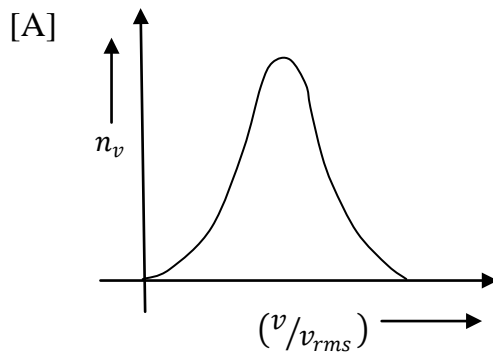


- [A] 0.5 J                      [B] - 2 J                      [C] 2 J                      [D] - 0.5 J
- The speed of a homogeneous solid after rolling down an inclined plane of vertical height  $h$ , from rest without sliding is  
 [A]  $\sqrt{gh}$                       [B]  $\sqrt{\frac{9}{5}gh}$                       [C]  $\sqrt{\frac{10}{7}gh}$                       [D]  $\sqrt{\frac{4}{3}gh}$

9. A cyclist speeding at 18 km/h on a level road takes a sharp circular turn of radius 3m without reducing the speed. The co-efficient of static friction between the tyres and the road is 0.1, which of the following is true for the cyclist?
- [A] The cyclist will slip while taking the circular turn.  
 [B] The cyclist does not slip while taking the circular turn.  
 [C] The cyclist should increase the speed to avoid the slipping.  
 [D] All of the above may be true.
10. The centre of mass of a system of three particles of mass 100g, 150g and 200g kept at the vertices of an equilateral triangle of side 0.5m long will be
- [A]  $\left(\frac{5}{18}, \frac{1}{3\sqrt{3}}\right) m$     [B]  $\left(\frac{5}{17}, \frac{1}{3\sqrt{3}}\right) m$     [C]  $\left(\frac{6}{5}, \frac{1}{\sqrt{3}}\right) m$     [D] None of these
11. A particle of mass  $m$  is moving in a horizontal circle of radius  $r$  under a centripetal force equal to  $-k/r^2$ , where  $k$  is a constant. The total energy of the particle is
- [A]  $-k/2r$     [B]  $k/2r$     [C]  $-k/r$     [D]  $k/r$
12. Three metals of Young's modulus  $Y_1, Y_2$  and  $Y_3$  are joined together. What is the Young's modulus of the combination?

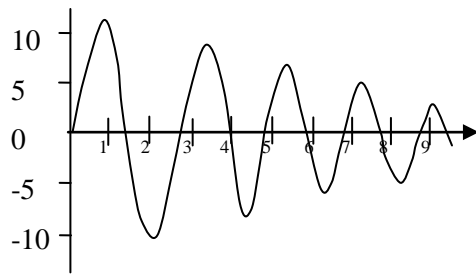


- [A]  $Y = Y_1 + Y_2 + Y_3$     [B]  $Y = \frac{1}{2}(Y_1 + Y_2 + Y_3)$   
 [C]  $Y = \frac{1}{3}(Y_1 + Y_2 + Y_3)$     [D]  $Y = Y_1 \cdot Y_2 \cdot Y_3$
13. Which of the following shows Maxwell's distribution of molecular speeds?

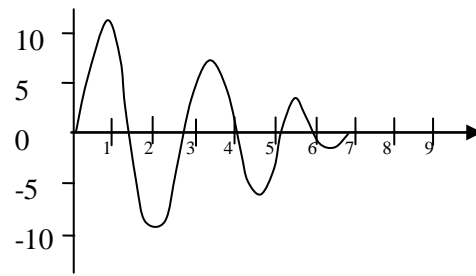


14. Which of the following displacement (x) versus time (t) graph shows greatest damping?

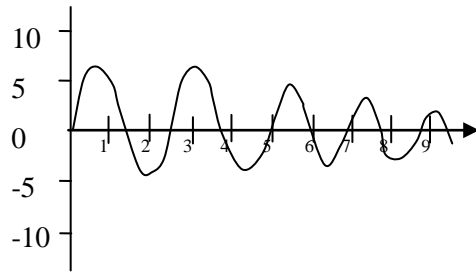
[A]



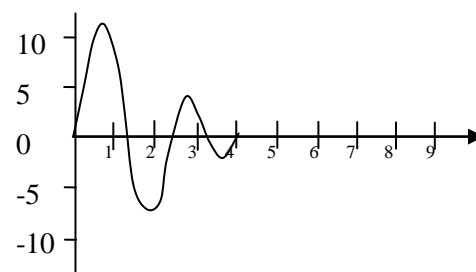
[B]



[C]



[D]



15. The electric potential and electric field due to an electric dipole at large distances

[A] falls off as  $1/r^2$  and  $1/r^2$  respectively.

[B] falls off as  $1/r^2$  and  $1/r^3$  respectively.

[C] falls off as  $1/r$  and  $1/r^2$  respectively.

[D] falls off as  $1/r^3$  and  $1/r^5$  respectively.

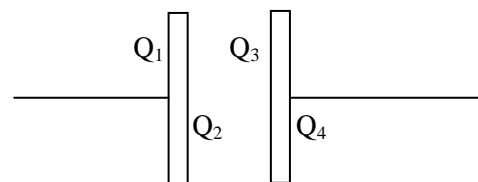
16. In an isolated parallel plate capacitor of capacitance C, the four surfaces have Charges Q1, Q2, Q3 and Q4 as shown. The potential difference between the plate is

[A]  $\frac{Q_1+Q_2+Q_3+Q_4}{2C}$

[B]  $\frac{Q_2+Q_3}{2C}$

[C]  $\frac{Q_2-Q_3}{2C}$

[D]  $\frac{Q_1+Q_4}{2C}$



17. The force per unit length between two parallel straight wires carrying parallel currents I in each separated by a distance (d) is

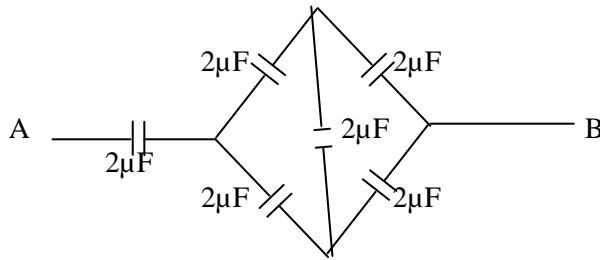
[A]  $\frac{\mu_0 I^2}{2d}$ , attractive

[B]  $\frac{\mu_0 I^2}{2\pi d}$ , repulsive

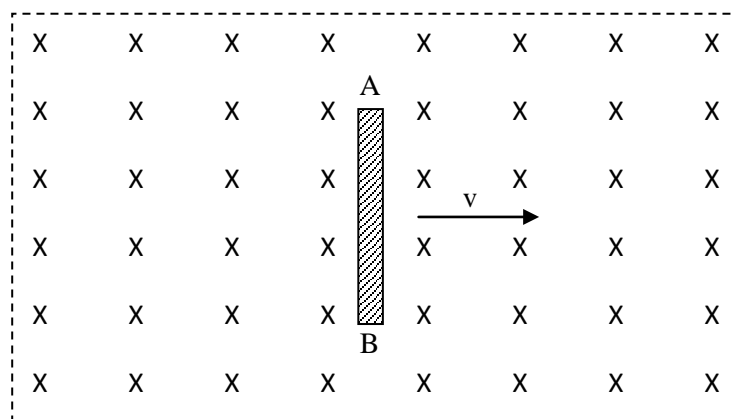
[C]  $\frac{\mu_0 I^2}{2\pi d}$ , attractive

[D]  $\frac{\mu_0 I^2}{2d}$ , repulsive

18. The equivalent capacity between A and B is



- [A]  $1\mu\text{F}$                       [B]  $2\mu\text{F}$                       [C]  $4\mu\text{F}$                       [D]  $8\mu\text{F}$
19. A rod AB moves with a uniform velocity ( $v$ ) in a uniform magnetic field as shown in the figure.

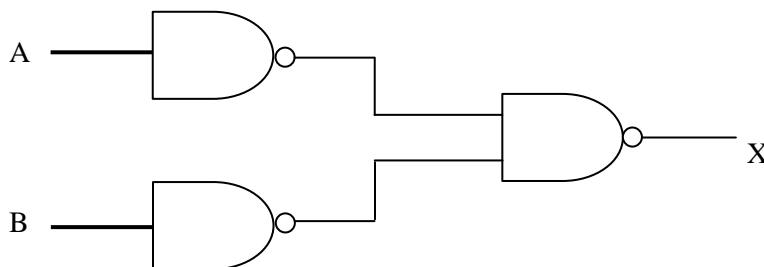


- [A] The rod becomes electrically charged  
 [B] The end A becomes positively charged.  
 [C] The end B becomes positively charged  
 [D] The rod becomes hot due to Joules heating.
20. Soft iron is used for permanent magnet since  
 [A] Both coercivity and retentivity are low for soft iron.  
 [B] Both coercivity and retentivity are high for soft iron.  
 [C] Coercivity for soft iron is low and its retentivity is high.  
 [D] Coercivity for soft iron is high and its retentivity is low.
21. If the binding energy per nucleon of  ${}^7_3\text{Li}$  and  ${}^4_2\text{Li}$  are  $5.6\text{MeV}$  and  $7.06\text{MeV}$  respectively, then the energy released in the reaction  ${}^7_3\text{Li} + {}^1_1\text{H} = [{}^4_2\text{He}]$  is  
 [A]  $71.26\text{MeV}$             [B]  $17.26\text{MeV}$             [C]  $26.7\text{MeV}$             [D]  $62.7\text{MeV}$
22. In an electromagnetic wave travelling in vacuum, the amplitudes  $E_o$  and  $B_o$  of the electric and magnetic fields are related as ( $c = \text{speed of light}$ )  
 [A]  $E_o = cB_o$             [B]  $E_o = B_o/c$             [C]  $E_o = c^2B_o$             [D]  $E_o = B_o$

23. If the kinetic energy of free electron is doubled, then its de-Broglie wavelength changes by a factor

[A]  $1/2$                       [B]  $1/\sqrt{2}$                       [C] 2                      [D]  $\sqrt{2}$

24. The combination of gates as shown in figure yields



- [A] NAND gate      [B] OR gate                      [C] NOT gate                      [D] XOR gate
25. In an experiment to measure  $\beta$  of a transistor, a change of 8mA in the emitter current produces a change of 7.8mA in the collector current. The value of current gain  $\beta$  is
- [A] 0.975                      [B] 39                      [C] 139                      [D] 16

### SECTION-B: CHEMISTRY (Q. 26 – 50)

26. A gaseous mixture contains oxygen and nitrogen in the ratio of 1:4 by weight. The ratio of number of molecules is
- [A] 1:4                      [B] 2:7                      [C] 7:32                      [D] 3:16
27. The normality of 0.5M –  $H_3PO_4$  solution is
- [A] 1                      [B] 1.5                      [C] 2.5                      [D] 3.5
28. Examples of isodiapheres are
- [A]  ${}^{239}_{94}Pu$  and  ${}^{235}_{92}U$                       [B]  ${}^{23}_{11}Na$  and  ${}^{24}_{12}Mg$   
 [C]  ${}^{40}_{18}Ar$  and  ${}^{40}_{19}K$                       [D] None of these
29. Transition from  $n = 3, 4, 5$  to  $n = 2$  gives rise to
- [A] Paschen Series      [B] Balmer Series      [C] Lyman Series      [D] Brackett Series
30. When precipitation occurs in a solution, then
- [A] ionic product = solubility product      [B] ionic product < solubility product  
 [C] ionic product > solubility product      [D] None of these
31. The unit of rate constant of 3<sup>rd</sup> order reaction is
- [A]  $mol\ dm^{-3}\ s^{-1}$       [B]  $mol^{-1}\ dm^3\ s^{-1}$       [C]  $mol^2\ dm^{-6}\ s^{-1}$       [D]  $mol^{-1}\ dm^6\ s^{-1}$
32. Vant's Hoff reaction isotherm is
- [A]  $\Delta G^\circ = -RT \ln K_p$                       [B]  $\Delta G = \Delta H - T\Delta S$   
 [C]  $\Delta A = \Delta E - T\Delta S$                       [D] None of these

33. The increasing order of bond length of the following is  
 $O_2^+, O_2^-, O_2$   
 [A]  $O_2^+ < O_2 < O_2^-$  [B]  $O_2^- < O_2 < O_2^+$   
 [C]  $O_2^- < O_2^+ < O_2$  [D] None of these
34. The boiling point of *p*-nitrophenol is higher than *o*-nitrophenol because it has  
 [A] intermolecular H-bonding [B] intra-molecular H-bonding  
 [C] H-bonding [D] None of these
35. At room temperature which one is correct  
 [A]  $C_{rms}(H_2) > C_{rms}(N_2) > C_{rms}(O_2)$   
 [B]  $C_{rms}(N_2) > C_{rms}(H_2) > C_{rms}(O_2)$   
 [C]  $C_{rms}(O_2) > C_{rms}(N_2) > C_{rms}(H_2)$   
 [D] None of these
36. Which of the following hybridization have square planer and trigonal planer geometry of complex respectively:  
 [A]  $sp^2$  and  $dsp^3$  [B]  $dsp^2$  and  $sp^2$  [C]  $sp^2$  and  $d^2sp^3$  [D]  $dsp^3$  and  $sp^3d^2$
37. The PH range of methyl red is  
 [A] 3 – 4.8 [B] 4.2 – 6.3 [C] 8.3 – 10.0 [D] None of these
38. What is D in the following reaction  

$$CH_3CHO \xrightarrow{K_2Cr_2O_7/H_2SO_4} A \xrightarrow{NH_3} B \xrightarrow{-H_2O/\Delta} C \xrightarrow{Br_2/KOH} D$$
  
 [A]  $CH_3NH_2$  [B]  $CH_3COOH$  [C]  $CH_3COONH_2$  [D] None of these
39. Which of the following is not permissible arrangement of electrons in an atom  
 [A]  $n = 5, l = 3, m = 0, s = +1/2$  [B]  $n = 3, l = 2, m = -3, s = -1/2$   
 [C]  $n = 3, l = 2, m = -2, s = -1/2$  [D]  $n = 4, l = 0, m = 0, s = -1/2$
40. The correct order of radii is  
 [A]  $N < Be < B$  [B]  $F^- < O^{2-} < N^{3-}$  [C]  $Na < Li < K$  [D]  $Fe^{3+} < Fe^{2+} < Fe^{4+}$
41. A solid made of two elements A and B. Atoms of B are in ccp arrangement and atoms of A occupy 1/3rd of tetrahedral sites. The formula of the compound is  
 [A]  $AB_2$  [B]  $A_2B$  [C]  $A_2B_3$  [D]  $A_3B_2$
42. The rate equation for gaseous reaction is rate = k [A][B], if the volume of the reaction vessel containing these gases is reduced to half the initial volume, the rate of the reaction would be  
 [A] 1/4 of the original rate [B] 4 times the original rate  
 [C] double the original rate [D] half the original rate
43. 10 ml of 1(N) NaOH is mixed 5 ml of 2(N) HCl solution. The resulting solution is  
 [A] alkaline [B] acidic [C] neutral [D] can't be predicted

44. Predict which of the following set will indicate the most spontaneous process

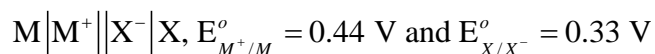
[A]  $\Delta H = +ve, \Delta S = +ve$

[B]  $\Delta H = +ve, \Delta S = -ve$

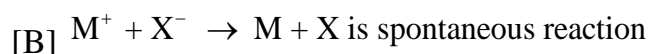
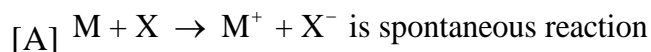
[C]  $\Delta H = -ve, \Delta S = -ve$

[D]  $\Delta H = -ve, \Delta S = +ve$

45. For the electrochemical cell,



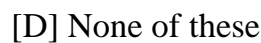
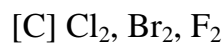
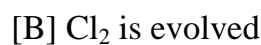
From these data one can deduce that



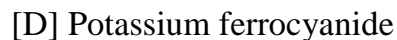
[C]  $E_{\text{cell}} = 0.77 \text{ V}$

[D]  $E_{\text{cell}} = -0.77 \text{ V}$

46. When  $I_2$  passed through KCl, KF, KBr



47. Which reagent can be used to identify nickel ion



48. The number of isomers of  $C_6H_{14}$  is

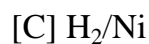
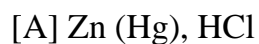
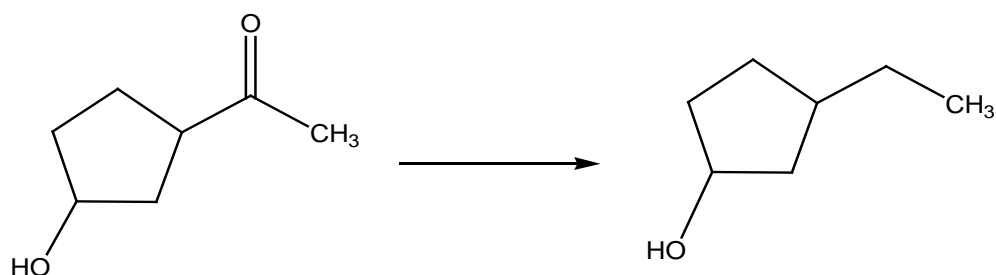
[A] 4

[B] 5

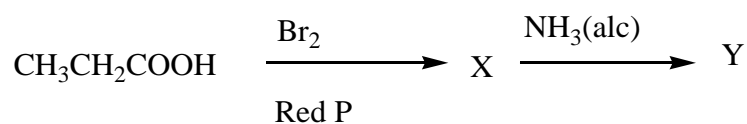
[C] 6

[D] 7

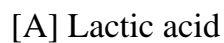
49. The appropriate reagent for the transformation



50.



Y in the above reaction is





## SECTION-C: MATHEMATICS (Q. 51 – 100)

51. If  $A = \{x: x \in R \text{ and } 1 \geq 2x - 3 \geq 0\}$  and  $B = \{x: x \in R \text{ and } \frac{3}{2} < 2 + 3x < 5\}$ . Then  $A \cap B$  is equal to  
 [A]  $\{x \in R: 1 \leq 2 + 3x < 5\}$  [B]  $A \cap B = \varphi$   
 [C]  $\{x \in R: -\frac{1}{6} \leq x \leq 2\}$  [D]  $\{x \in R: -\frac{1}{6} \leq x \leq 5\}$
52. If  $f(x) = x^2 - 3x + 1$  and  $f(2u) = 2f(u)$ , then u is equal to  
 [A]  $\frac{1}{\sqrt{2}}$  [B]  $-\frac{1}{\sqrt{2}}$  [C]  $\pm \frac{1}{\sqrt{2}}$  [D] None of these
53. The range of the function  $f(x) = {}^{7-x}P_{x-3}$  is  
 [A]  $\{1, 2, 3\}$  [B]  $\{1, 2, 3, 4\}$  [C]  $\{2, 3, 4\}$  [D]  $\{2, 3, 4, 5\}$
54. If  $\vec{a}, \vec{b}, \vec{c}$  are non-coplanar vectors and x, y, z are scalars such that  $x\vec{a} + y\vec{b} + z\vec{c} = 0$ , then  
 [A]  $x = y = z = 0$  [B]  $x \neq y \neq z \neq 0$  [C]  $x = y = z \neq 0$  [D] None of these
55. If  $\vec{a}$  and  $\vec{b}$  are unit vectors and  $\theta$  is the angle between them, then  $\frac{1}{2}|\vec{a} - \vec{b}|$  is equal to  
 [A]  $\cos \frac{\theta}{2}$  [B]  $\sin \frac{\theta}{2}$  [C]  $\tan \frac{\theta}{2}$  [D]  $\sin \theta$
56. If  $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$ , then  $\cos \theta + \sin \theta$  is equal to  
 [A]  $\cos \theta$  [B]  $\sin \theta$  [C]  $\sqrt{2} \cos \theta$  [D]  $-\sqrt{2} \sin \theta$
57. For a man in a boat, the angle of elevation of the top of a tower on the bank is  $30^\circ$ . After approaching towards it for 15 minutes, the angle of elevation becomes  $60^\circ$ . Then the subsequent time required by the man to reach the tower is  
 [A]  $7\frac{1}{2}$  minutes [B]  $14\frac{1}{2}$  minutes [C]  $10\frac{1}{2}$  minutes [D]  $17\frac{1}{2}$  minutes
58. If  $f$  is derivable at  $x = a$ , then  $\lim_{x \rightarrow a} \frac{xf(a) - af(x)}{x-a}$  is equal to  
 [A]  $f'(a)$  [B]  $af'(a) - f(a)$  [C]  $f(a) - af'(a)$  [D] None of these
59. The function  $f$  defined by  $f(x) = |1 - x + |x||$  for any real x is  
 [A] continuous function [B] discontinuous function  
 [C] differentiable function [D] None of these
60. Let n be a positive integer and  $\Delta_r = \begin{vmatrix} 2r-1 & {}^nC_r & 1 \\ n^2-1 & 2^n & n+1 \\ \tan^2(n^2) & \tan^2(n) & \tan^2(n+1) \end{vmatrix}$   
 Then  $\sum_{r=0}^n \Delta_r =$   
 [A] 0 [B] 1 [C] n [D]  $\frac{n(n+1)}{2}$
61. Let  $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$ ,  $a, b \in \mathbb{N}$ . Then  
 [A] There exist more than one but finite numbers of B such that  $AB = BA$ .  
 [B] There exist exactly one B such that  $AB = BA$ .  
 [C] There exists infinitely many B such that  $AB = BA$ .  
 [D] There cannot exist any B such that  $AB = BA$ .

62. If  $Z_1$  and  $Z_2$  are two non-zero complex numbers such that  $|Z_1 + Z_2| = |Z_1| + |Z_2|$ . Then  $\arg(Z_1) - \arg(Z_2)$  is equal to  
 [A]  $-\pi$  [B]  $\pi/2$  [C]  $-\pi/2$  [D] 0
63. If in the equation  $ax^2 + bx + c = 0$  all a, b, c are odd integers, then  
 [A] Roots are all rational [B] The roots are irrational  
 [C] Roots are equal [D] None of these
64. The sum of all the three digits numbers which leaves the remainder 2 when divided by 5 is  
 [A]  $90 \times 1099$  [B]  $90 \times 1090$  [C]  $180 \times 102$  [D]  $180 \times 997$
65. The sum of the series  $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \frac{1}{8!} + \dots$  is  $\propto$   
 [A]  $\frac{e^2+1}{2}$  [B]  $\frac{e^2-1}{2}$  [C]  $e^2 + 1$  [D]  $\frac{(e-1)^2}{2e}$
66. The number of rectangles in the following figure


- [A] 120 [B] 30 [C] 150 [D] 80
67. Solution of  $y \log y dx + (x - \log y)dy = 0$  is  
 [A]  $x \log y = \frac{1}{2}(\log y)^2 + C$  [B]  $y \log x = \frac{1}{2}(\log x)^2 + C$   
 [C]  $x \log y = \frac{1}{2}(\log x)^2 + C$  [D] None of these
68. Angles of the triangles formed by the lines  $x + y = 0, x - y = 0$  and  $y = 7$  are  
 [A]  $45^\circ, 45^\circ, 90^\circ$  [B]  $30^\circ, 60^\circ, 90^\circ$   
 [C]  $60^\circ, 60^\circ, 60^\circ$  [D] None of these
69. An ellipse has OB as its semi-major axis, F and F' are foci and  $\angle FBF' = 90^\circ$ . Then the eccentricity of the ellipse is  
 [A]  $1/4$  [B]  $1/\sqrt{3}$  [C]  $1/\sqrt{2}$  [D]  $1/2$
70. If  $F(x) = \int \sqrt{f(x)} dx, f'(2) = f(2) > 0$ , then  $F''(2)$  is  
 [A]  $1/2\sqrt{f(2)}$  [B] 2 [C]  $\sqrt{2}$  [D]  $\sqrt{f(2)}/2$
71. Let  $A = \{x: |\sin x| \leq \frac{1}{2}\}$  and  $B = [-\frac{\pi}{2}, \frac{\pi}{2}]$ , then  $A \cap B$  is equal to  
 [A]  $[-\frac{\pi}{6}, \frac{5\pi}{6}]$  [B]  $[-\frac{\pi}{6}, \frac{\pi}{6}]$  [C]  $[0, \frac{\pi}{6}]$  [D]  $[\frac{\pi}{6}, \frac{5\pi}{6}]$

72. Let  $f(x) = \frac{1}{x}$  and  $D_f = [a, b]$  where  $0 < a < b$ , then the range of the function is  
 [A]  $\left[\frac{1}{a}, \frac{1}{b}\right]$  [B]  $[b, a]$  [C]  $\left[\frac{1}{b}, \frac{1}{a}\right]$  [D]  $[a, b]$
73. If  $\alpha, \beta$  are non-real cube roots of unity, then  $\alpha\beta + \alpha^5 + \beta^5$  equals  
 [A] 1 [B] 0 [C] -1 [D] 3
74. The value of  $k$  ( $k > 0$ ) for which the equations  $x^2 + kx + 64 = 0$  and  $x^2 - 8x + k = 0$  both will have real roots is  
 [A] 8 [B] 16 [C] -64 [D] 46
75. The value of  $\begin{vmatrix} \log_z x & \log_z y & 1 \\ 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \end{vmatrix}$  is  
 [A] 3 [B] 1 [C] 0 [D]  $\log x + \log y + \log z$
76. The equations  $x + 2y + 2z = 1$  and  $2x + 4y + 4z = 9$  have  
 [A] only one solution [B] only two solutions  
 [C] no solution [D] infinitely many solutions
77. Let  $P(n)$  be the statement  $2^n < n!$ , where  $n$  is a natural number, then  $P(n)$  is true for  
 [A] all  $n$  [B] all  $n > 2$  [C] all  $n > 3$  [D] none of these
78. If the binomial expansion of  $(a + bx)^{-2}$ ,  $|x| < \frac{a}{b}$ ;  $a, b > 0$  is  $\frac{1}{4} - 3x + \dots$ , then  
 [A]  $a = 2, b = 12$  [B]  $a = 12, b = 2$  [C]  $a = 2, b = 8$  [D]  $a = 8, b = 2$
79. If  $x$  is very small numerically as compared with 'a' such that  

$$\left(\frac{a}{a+x}\right)^{1/2} + \left(\frac{a}{a-x}\right)^{1/2} = 2 + \lambda \frac{x^2}{a^2}$$
 Then the value of  $\lambda$  is  
 [A] 1 [B]  $\frac{3}{4}$  [C]  $\frac{1}{4}$  [D]  $\frac{1}{2}$
80. Let  $S_1, S_2, S_3$  be the sums of  $n$  terms of three series in arithmetic progression, the first term of each being 1 and the common differences 1, 2, 3 respectively. If  $S_1 + S_3 = \lambda S_2$ , then the value of  $\lambda$  is  
 [A] 1 [B] 2 [C] 3 [D] 4
81. If  $a_n$  be the  $n$ -th term of a geometric progression of positive numbers and  $\sum_{n=1}^{100} a_{2n} = 2\alpha$ ,  $\sum_{n=1}^{100} a_{2n-1} = \beta$  such that  $\alpha \neq \beta$ , then the common ratio of the geometric progression is  
 [A]  $\frac{\alpha}{\beta}$  [B]  $\frac{\beta}{\alpha}$  [C]  $\sqrt{\frac{\alpha}{\beta}}$  [D]  $\sqrt{\frac{\beta}{\alpha}}$
82. If  $f(x)$  is any function which assumes only positive values and  $f'(x)$  exists, then  $f'(x)$  is equal to  
 [A]  $f(x) \frac{d}{dx} (e^{f(x)})$  [B]  $f(x) \frac{d}{dx} \{\log f(x)\}$   
 [C]  $f(x) \frac{d}{dx} \{e^{\log f(x)}\}$  [D] none of these

83. Let  $F(x) = \begin{cases} 3x - 4 & \text{for } 0 \leq x \leq 2 \\ 2x + \lambda & \text{for } 2 < x \leq 3 \end{cases}$ . If  $F(x)$  is continuous at  $x = 2$ , then  $\lambda$  is equal to  
 [A]  $-2$  [B]  $-1$  [C]  $0$  [D]  $2$
84. The equation of the tangent to the curve  $y = be^{-x/a}$  at the point where it crosses the Y - axis is  
 [A]  $ax + by = 1$  [B]  $x + y = a + b$  [C]  $x + y = ab$  [D]  $\frac{x}{a} + \frac{y}{b} = 1$
85. If  $g''(x)$  is continuous for all  $x$ ,  $g(0) = g'(1) = 1$  and if  $\int_0^1 xg''(x) dx$  vanishes, then the value of  $g(1)$  is  
 [A]  $2$  [B]  $-2$  [C]  $3$  [D]  $9/2$
86. If  $f(x)$  and  $g(x)$  are solutions of the differential equation  $a \frac{d^2y}{dx^2} + x^2 \frac{dy}{dx} + y = e^x$ , then  $f(x) - g(x)$  is a solution of the equation  
 [A]  $a^2 \frac{d^2y}{dx^2} + \frac{dy}{dx} + y = e^x$  [B]  $a^2 \frac{d^2y}{dx^2} + y = e^x$   
 [C]  $a^2 \frac{d^2y}{dx^2} + x^2 \frac{dy}{dx} + y = 0$  [D]  $\frac{d^2y}{dx^2} + y = e^x$
87. The differential equation  $y \frac{dy}{dx} = a - x$  ( $a \in R$ ) represents  
 [A] a family of circles with centres on y-axis  
 [B] a family of circles with centres on x-axis  
 [C] a family of circles with a given radius  
 [D] a family of circles with centres at origin.
88. The equation of the straight line drawn through the focus of the parabola  $y^2 = -4x$  at an angle of  $120^\circ$  to the x-axis is  
 [A]  $y + \sqrt{3}(x - 1) = 0$  [B]  $y - \sqrt{3}(x - 1) = 0$   
 [C]  $y + \sqrt{3}(x + 1) = 0$  [D]  $y - \sqrt{3}(x + 1) = 0$
89. Two vectors  $\vec{a}$  and  $\vec{b}$  are non-zero and non-collinear. The value of  $|x|$  for which the vectors  $\vec{p} = (x - 2)\vec{a} + \vec{b}$  and  $\vec{q} = (x + 1)\vec{a} - \vec{b}$  are collinear is  
 [A]  $2$  [B]  $1$  [C]  $2/3$  [D]  $1/2$
90. A student appears for tests I, II and III. The student is successful, if he passes either in tests I and II or in tests I and III. The probabilities of the student passing in test I, II and III are  $p$ ,  $q$  and  $1/2$  respectively. If the probability that the student is successful is  $1/2$ , then  
 [A]  $p = q = 1$  [B]  $p = 0, q = 1$  [C]  $p = 1, q = 0$  [D]  $p = 1, q = 1/2$
91. If  $p = \frac{1}{2} \sin^2 \theta + \frac{1}{3} \cos^2 \theta$ , then  
 [A]  $\frac{1}{3} \leq p \leq \frac{1}{2}$  [B]  $p \geq \frac{1}{2}$  [C]  $2 \leq p \leq 3$  [D]  $\frac{-\sqrt{13}}{6} \leq p \leq \frac{\sqrt{13}}{6}$
92. If  $w = \left(\frac{z-i}{1+iz}\right)^n$ ,  $n \in I$ , then  $|w| = 1$  for  
 [A] Only even  $n$  [B] only odd  $n$  [C] only positive  $n$  [D] all  $n$ .

93. The number of real solution of  $|2x - x^2 - 3| = 1$  is  
 [A] 0 [B] 2 [C] c [D] 4
94. The number of ways in which the letters of the word “ARRANGE” can be permuted such that R’s occur together is  
 [A]  $\frac{7!}{2!2!}$  [B]  $6!$  [C]  $\frac{6!}{2!}$  [D] none of these
95. For all  $n \in \mathbb{N}$ ,  $3 \times 5^{2n+1} + 2^{3n+1}$  is divisible by  
 [A] 19 [B] 17 [C] 23 [D] 25.
96.  $\lim_{x \rightarrow 0} \frac{|\sin x|}{x}$  is  
 [A] 1 [B] -1 [C] 0 [D] non-existent.
97.  $\int_{0.2}^{3.5} [x] dx = ?$   
 [A] 3.3 [B] 3.7 [C] 1.65 [D] 4.5
98. If  $\vec{a}$  and  $\vec{b}$  are unit vectors and  $\theta$  is angle between, then  $|\hat{a} - \hat{b}| =$   
 [A]  $\sin(\frac{\theta}{2})$  [B]  $2\sin(\frac{\theta}{2})$  [C]  $2\cos(\frac{\theta}{2})$  [D]  $\cos(\frac{\theta}{2})$
99. If  $P(A \cap B) = \frac{1}{2}$ ,  $P(A' \cap B') = \frac{1}{3}$ ,  $P(A) = p$ ,  $P(B) = 2p$ , then the value of p=  
 [A]  $\frac{1}{3}$  [B]  $\frac{7}{18}$  [C]  $\frac{4}{9}$  [D]  $\frac{1}{9}$
100. The negation of the sentence “72 is divisible by 2 and 3”, is  
 [A] 72 is not divisible by 2 or 72 is not divisible by 3  
 [B] 72 is not divisible by 2 and 72 is not divisible by 3  
 [C] 72 is divisible by 2 and 72 is not divisible by 3  
 [D] 72 is not divisible by 2 and 72 is divisible by 3

#### SECTION-D: ENGLISH (Q. 101 – 125)

51. Sita and Geeta went to Delhi yesterday (*Select which part of speech is the underlined word*)  
 [A] Preposition [B] Conjunction [C] Noun [D] Interjection
52. I cannot make any head or tail of this matter. (*Choose the meaning of the underlined idiom*)  
 [A] to solve [B] to understand even minimally  
 [C] to appreciate [D] to remember
53. \_\_\_\_\_ on earth is immortal. (*Fill in the blank with appropriate word*)  
 [A] A man [B] Everyman [C] No man [D] The man
54. He spent \_\_\_\_\_ money he had. (*Fill in the blank with appropriate word*)  
 [A] a little [B] the little [C] little [D] a few

55. Choose the correctly pluralized word.  
 [A] phenomenon [B] memoranda [C] bacteria [D] linguistics
56. My uncle decided to take ..... and my sister to the market. (Pick up the most effective word to make the sentence meaningful)  
 [A] I [B] mine [C] me [D] myself
57. Man does not live by ..... alone. (Pick up the most effective word to make the sentence meaningful)  
 [A] food [B] bread [C] meals [D] diet
58. Pain : Sedative (Select the pair which has the same type of relationship as in the given pair).  
 [A] comport : stimulant [B] grief: consolation  
 [C] trance: narcotic [D] ache : extraction
59. Mortal ( Choose the exact opposite word)  
 [A] Divine [B] Immortal [C] Spiritual [D] Eternal
60. . \_\_\_\_\_milk is good for you. (Choose the correct option)  
 [A] A [B] An [C] The [D] None
61. Let's go to the movies. I have ---- money. (Choose the correct option)  
 [A] a little [B] little [C] few [D] a few
62. Stephen Crane's schooling was not continuous; ---- he read all of the 19th-century English writers and the Greek and Latin classics. (Choose the correct conjunction)  
 [A] because [B] thus [C] nonetheless [D] therefore
63. ---- of what he said was very sensible. (Choose the correct option)  
 [A] Many [B] Much [C] Few [D] A few
64. There was little information at the airport. ---- people seemed to have ---- idea about what time the flight was likely to leave. (Choose the correct option)  
 [A] Many / any [B] A lot of / any [C] Few / no [D] Only a few / some
65. He is the right man in the *right* place. (What part of speech is the word in italics?)  
 [A] verb [B] adjective [C] preposition [D] abstract noun
66. His theories are *hard* to understand. (What part of speech is the word in italics?)  
 [A] preposition [B] abstract noun [C] verb [D] adjective
67. Where's your brother right now? (Choose the correct option)  
 [A] He is at work. [B] He is on work. [C] He is in work. [D] He is in the work.
68. Do you want me to help you \_\_\_\_\_ this? (Choose the correct preposition)  
 [A] Before [B] With [C] By [D] For
69. Choose the option with correct punctuation marks.  
 [A] "Only one course was open to us: surrender," said the ex-major, "and we did."  
 [B] "Only one course was open to us: surrender" said the ex-major, "and we did."  
 [C] "Only one course was open to us: surrender," said the ex-major "and we did."  
 [D] "Only one course was open to us: surrender," said the ex-major, "And we did."

70. If she \_\_\_\_\_ about his financial situation, she would have helped him out.  
(Choose the correct option)  
[A]knew [B]had been knowing  
[C]had known [D]have known
71. By the time she arrives, we \_\_\_\_\_ our homework. (Choose the correct option)  
[A]finish [B] will have finished  
[C]will finish [D]were finished
72. He never acts like a gentleman,----? (Chose the correct question tag)  
[A] doesn't he [B]do he [C]isn't he [D] does he
73. Bruno, on the other hand, likes the view that he gets from the log cabin up in the mountains, and he enjoys hiking in the forest. (Choose the correct option)  
[A] Simple Sentence [B] Compound Sentence  
[C] Complex Sentence [D] Compound-Complex Sentence
74. Apprise (Select the correct meaning of the word)  
[A] Kidnap [B] Inform [C] Threaten [D] Calculate value
75. The firemen were able to----- the fire in Church Street.  
(Select the correct Phrasal verb to complete the sentence)  
[A] put [B] put at [C] put off [D] put out

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SPACE FOR ROUGH WORK  
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SPACE FOR ROUGH WORK

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