AS PER LATEST NTA NOTIFICATTION

Test Booklet Code

JEE MAIN-GT- 01

T1

Date of Examination
____/____/_____

Time: 3hrs: 00min.

Maximum Marks :300

Important Instructions

1. The test is of 3 **hours 00 minutes** duration and the Test Booklet contains 60 multiple-choice questions (four options with a single correct answer) and 15 Numerical type Answer from **Physics, Chemistry and Mathematics. 25** questions in each subject are divided into T**wo Sections (A and B)** as per details given below:
   (a) **Section A (MCQ's)**shall consist of 20**(Twenty) Questions** in each subject
   (Question Nos- 1 to 20(Physics) ,26 to 45(chemistry) and 51 to 70(mathematics).
   All questions are compulsory.
   (b) **Section B (NTA)**shall consist of 5**(Five) questions** in each subject
   (Question Nos-21 to 25(physics),46 to 50(chemistry) and 71 to 75(mathematics). In Section B, a candidate needs to attempt **all 5(Five)** questions in each subject.
2. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 300. There is no negative marking for **Section – B** (Numerical Type Response)
3. Use Blue/Black Ball Point Pen only for writing particulars on these page/marking responses on Answer Sheet
4. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test booklet with them
5. The CODE for this Booklet is **T1**. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer sheet.
6. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet:
7. Use of white fluid for correction is NOT permissible on the Answer Sheet
8. No candidate, without special permission of the Centre Superintendent or Invigilator, would leave his/her seat.
9. Use of Electronic/Manual Calculator is prohibited.
10. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in s Examination Room/ Hall cases of unfair means will be dealt with per Rules and Regulations of examination.
11. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
12. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/ Answer Sheet in the Attendance Sheet

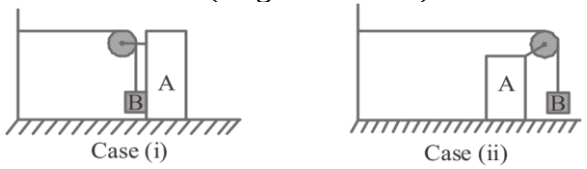
Name of candidate (in capitals): _____

Roll Number: _____ Invigilator's Signature:_____

PHYSICS Section – A (MCQ's)

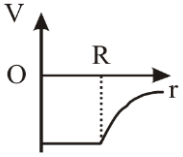
1. Two balls of same mass and carrying equal charge are hung by threads of length l from a fixed support. At electrostatic equilibrium, assuming that angles made by each thread is small, the separation, x between the balls is proportional to:
(A) l (B) l^2
(C) $l^{2/3}$ (D) $l^{1/3}$

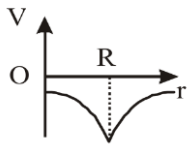
2. A 20 kg block B is suspended from a cord attached to a 40 kg cart 1 Find the ratio of the acceleration of block in cases (i) and (ii) shown in the figure immediately after the system is released from rest. (Neglect friction)

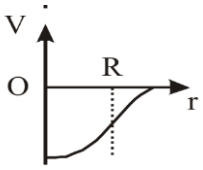


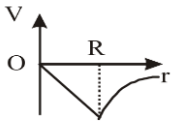
(A) $\frac{\sqrt{2}}{3}$ (B) $3\sqrt{2}$
(C) $\frac{3}{2}$ (D) $\frac{3}{2\sqrt{2}}$

3. The diagram showing the variation of gravitational potential of earth with distance from the centre of earth is

(A) 

(B) 

(C) 

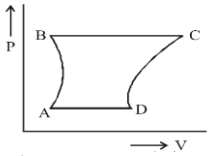
(D) 

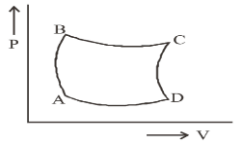
4. In "Al" and "Si", if temperature is changed from normal temperature to 70 K then
(A) The resistance of Al will increase and that of Si will decrease
(B) The resistance of Al will decrease and that of Si will increase
(C) Resistance of both decrease
(D) Resistance of both increase

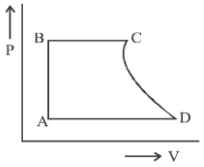
5. Two rods of length d_1 and d_2 and coefficients of thermal conductivities K_1 and K_2 are kept touching each other. Both have the same area of cross-section, the equivalent thermal conductivity is
(A) $K_1 + K_2$ (B) $K_1d_1 + K_2d_2$
(C) $\frac{d_1K_1 + d_2K_2}{d_1 + d_2}$ (D) $\frac{d_1 + d_2}{(d_1/K_1 + d_2/K_2)}$

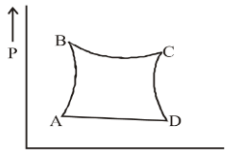
6. Charge q is uniformly spread on a thin ring of radius R. The ring rotates about its axis with a uniform frequency f Hz. The magnitude of magnetic induction at the centre of the ring is
(A) $\frac{\mu_0 qf}{2R}$ (B) $\frac{\mu_0 q}{2fR}$
(C) $\frac{\mu_0 q}{2\pi fR}$ (D) $\frac{\mu_0 qf}{2\pi R}$

7. A certain amount of gas is taken through a cyclic process (ABCDA) that has Two isobars, one isochore and one isothermal. The cycle can be represented on a P-V indicator diagram as :

(1) 

(2) 

(3) 

(4) 

8. A goods train accelerating uniformly on a straight railway track, approaches an electric pole standing on the side of track. Its engine passes the pole with velocity u and the guard's room passes with velocity v. The middle wagon of the train passes the pole with a velocity.
(A) $\frac{u+v}{2}$ (B) $\frac{1}{2}\sqrt{u^2+v^2}$
(C) $\sqrt{uv}$ (D) $\sqrt{\left(\frac{u^2+v^2}{2}\right)}$

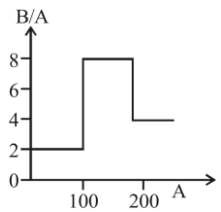
9. A wheel is rotating at 900 r.p.m. about its axis. When power is cut of fit comes to rest in 1 minute. The angular retardation in rad/s^2 is
(A) $\pi/2$ (B) $\pi/4$.
(C) $\pi/6$. (D) $\pi/8$

10. Two springs of force constants 300 N/m (Spring A) and 400 N/m (Spring B) are joined together in series. The combination is compressed by 8.75 cm. The ratio of energy stored in A and B is $\frac{E_A}{E_B}$. Then $\frac{E_A}{E_B}$ is equal to:
(A) $\frac{4}{3}$ (B) $\frac{16}{9}$
(C) $\frac{3}{4}$ (D) $\frac{9}{16}$

11. A particle of mass m is acted upon by a force F given by the empirical law $F = \frac{R}{t^2}v(t)$. If this law is to be tested experimentally by observing the motion starting from rest, the best way is to plot:
(A) $\log v(t)$ against $\frac{1}{t}$
(B) $v(t)$ against t^2
(C) $\log v(t)$ against $\frac{1}{t^2}$
(D) $\log v(t)$ against t

12. In case of a p - *n* junction diode at high value of reverse bias, the current rises sharply. The value of reverse bias is known as
(A) cut off voltage (B) zener voltage
(C) inverse voltage (D) critical voltage

13. Assume that the nuclear binding energy per nucleon (B/A) versus mass number (A) is as shown in the figure. Use this plot to choose the correct choice(s) given below.



(A) Fusion of Two nuclei with mass numbers lying in the range of $1 < A < 50$ will release energy
(B) Fusion of Two nuclei with mass numbers lying in the range of $51 < A < 100$ will release energy
(C) Fission of a nucleus lying in the mass range of $100 < A < 200$ will release energy when broken into Two equal fragments
(D) Fission of a nucleus lying in the mass range of $120 < A < 180$ will release energy when broken into Two equal fragments

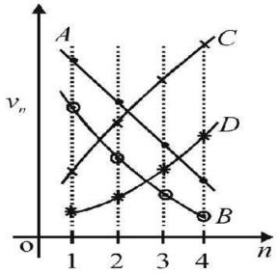
14. If 10% of a radioactive material decays in 5 days, then the amount of the original material left after 20 days is approximately
(A) 60% (B) 66%
(C) 70% (D) 75%

15. When white light passes through a dispersive medium, it breaks up into various colours. Which of the following statements is true?
(A) Velocity of light for violet is greater than the velocity of light for red colour.
(B) Velocity of light for violet is less than the velocity of light for re4
(C) Velocity of light is the same for all colours
(D) Velocity of light for different colours has nothing to do with the phenomenon of dispersion

16. A plate of mass (M) is placed on a horizontal frictionless surface and a body of mass (m) is placed on this plate. The coefficient of dynamic friction between this body and the plate is μ . If a force 3 μmg is applied to the body of mass(m) along the horizontal, the acceleration of the plate will be
(A) $\frac{\mu m}{M}g$ (B) $\frac{\mu mg}{M+m}$
(C) $\frac{3\mu mg}{M}$ (D) $\frac{2\mu mg}{M+m}$

17. Lights of Two different frequencies, whose photons have energies 1 eV and 2.5 eV respectively, successively illuminate a metal whose work function is 0.5 eV . The ratio of the maximum speeds of emitted electrons will be
(A) 1:5 (B) 1:4
(C) 1:2 (D) 1:1

18. Which of the plots shown in the figure represents speed (v_n) of the electron in a hydrogen atom as a function of the principal quantum number (n) ?



(A) B (B) D
(C) C (D) A

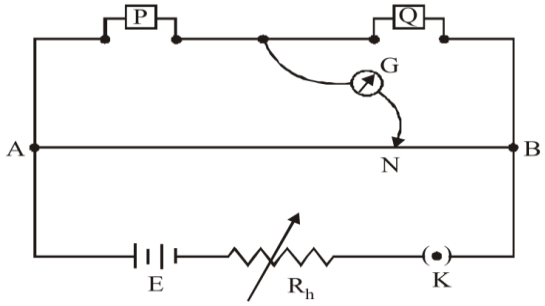
19. An engine has an efficiency of $1/6$. When the temperature of sink is reduced by $62^{o}C$, its efficiency is double4 Temperatures of source and sink are
(A) $99^{\circ}C, 37^{\circ}C$
(B) $124^{\circ}C, 62^{\circ}C$
(C) $37^{\circ}C, 99^{o}C$
(D) $62^{\circ}C, 124^{\circ}C$

20. A sinusoidal voltage of peak value 283 V and angular frequency $320/s$ is applied to a series LCR circuit. Given that $R = 5\Omega, L = 25mH$ and $C = 1000\mu F$. The total impedance, and phase difference between the voltage across the source and the current will respectively be:
(A) 10 Ω and $\tan^{-1}\left(\frac{5}{3}\right)$
(B) 7 Ω and 45°
(C) 10 Ω and $\tan^{-1}\left(\frac{8}{3}\right)$
(D) 7 Ω and $\tan^{-1}\left(\frac{5}{3}\right)$

PHYSICS Section – B (NTA)

21. A toy-car, blowing its horn, is moving with a steady speed of 5 m/s, away from a wall. An observer, towards whom the toy car is moving, is able to hear 5 beats per secon4 If the velocity of sound in air is 340 m/s, the frequency of the horn of the toy car is close to Hz.

22. In a meter bridge experiment resistance are connected as shown in the figure. Initially resistance $P = 4\Omega$ and the neutral point N is at 60 cm from 1 Now an unknown resistance R is connected in series to P and the new position of the neutral point is at 80 cm from 1 The value of unknown resistance R is ohm.



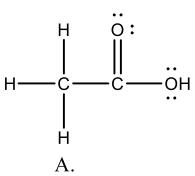
23. The circular head of a screw gauge is divided into200 divisions and move 1 mm ahead in one revolution. If the same instrument has a zero error of 0.05 mm and the reading on the main scale in measuring diameter of a wire is 6 mm and that on circular scale is 45. The diameter of the wire is _____ mm.

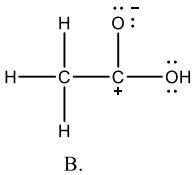
24. The radius of curvature of a thin plano-convex lens is 20 cm (of curved surface) and the refractive index is 1.5 If the plane surface is silvered, then it behaves like a concave mirror of focal length cm.

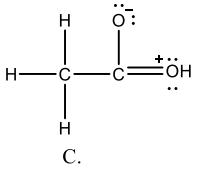
25. Three resistors of 4 $\Omega, 6\Omega$ and 12 Ω are connected in parallel and the combination is connected in series with a 1.5 V battery of l Ω internal resistance. The rate of Joule heating in the 4 Ω resistor is watt.

CHEMISTRY Section – A (MCQ's)

26. Which of the following resonance structure is lowest in energy?


A.


B.


C.

(A) A
(B) B
(C) C
(D) All have same energy

27. Which of the following pairs have identical bond order?
(A) N_2, O_2^{2+} (B) N_2, O_2^-
(C) N_2^-, O_2 (D) N_2, O^{2+}

28. In a compound AOH, electronegativity of ' A ' is 2.1, the compound would be
(A) Acidic
(B) Neutral towards acid & base
(C) Basic
(D) Amphoteric

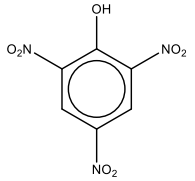
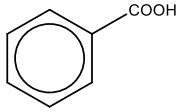
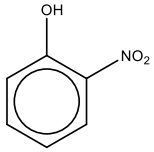
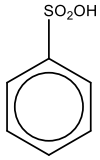
29. Which of the following orders is wrong?
(A) Electron affinity- N < O < *F* < C1
(B) Ist ionization potential- Be < B < N < O
(C) Basic property-
$MgO < CaO < FeO < Fe_2O_3$
(D) Reactivity- Be < Li < K < Cs

30. The following species will not exhibit disproportionation reaction
(A) ClO^- (B) ClO_2^-
(C) ClO_3^- (D) ClO_4^-

31. Given, $HF + H_2O \xrightarrow{K_a} H_3O^+ + F^-$
$F^- + H_2O \xrightarrow{K_b} HF + OH^-$
Which relation is correct?
(A) $K_b = K_w$ (B) $K_b = \frac{1}{K_w}$
(C) $K_a \times K_b = K_w$ (D) $\frac{K_a}{K_b} = K_w$

32. The oxidation states of sulphur in the anions $SO_3^{2-}, S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order
(A) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$
(B) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$
(C) $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$
(D) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

33. Heat of combustion of acetylene, carbon(s) and H_2(g) are –310, –94, –68 kcal/mole respectively.
Bond energy of C–H bond = 99 kcal
Heat of atomization of C = 171 kcal
Heat of atomization of H = 52 kcal
Bond energy of C ≡ C bond is Q kcal/mol.
Then Q is
(A) 142 (B) –58
(C) 194 (D) 310

34. Which of the following will not be soluble in sodium carbonate solution?
(1) 
(2) 
(3) 
(4) 

35. Although Al has a high oxidation potential it resists corrosion because of the formation of a tough, protective coat of
(A) $Al(NO_3)_2$ (B) AlN
(C) Al_2O_3 (D) $Al_2(CO_3)_2$

36. Which is used as medicine?
(A) PVC (B) Terylene
(C) Glyptal (D) Urotropine

37. In Lassaigne's test, the organic compound is fused with a piece of sodium metal in order to
(A) increase the ionisation of the compound
(B) decrease the melting point of the compound
(C) increase the reactivity of the compound
(D) convert the covalent compound into a mixture of ionic compounds

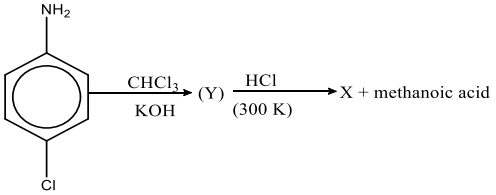
38. An aqueous solution of colourless metal sulphate M gives a white precipitate with NH_4OH. This was soluble in excess of NH_4OH. On passing H_2S through this solution a white ppt is formed. The metal M in the salt is
(A) Ca (B) Ba
(C) Al (D) Zn

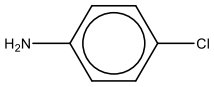
39. Which of the following oxidizing reaction of $KMnO_4$ occurs in acidic medium?
(i) Fe^{2+} (green) is converted to Fe^{3+} (yellow).
(ii) Iodide is converted to iodate.
(iii) Thiosulphate oxidized to sulphate.
(iv) Nitrite is oxidized to nitrate.
(A) (i) and(iii) (B) (i) and (iv)
(C) (iv) only (D) (ii) and(iv)

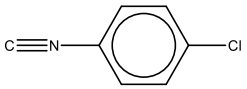
40. Which of the following compound cannot be used in preparation of iodoform?
(A) CH_3CHO (B) CH_3COCH_3
(C) HCHO (D) 2-propanol

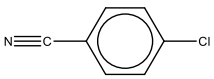
41. Anhydrous $AlCl_3$ cannot be obtained from which of the following reactions?
(A) Heating $AlCl_3.6H_2O$
(B) By passing dry HCl over hot aluminum powder
(C) By passing dry Cl_2 over hot aluminum powder
(D) By passing dry Cl_2 over a hot mixture of alumina and coke

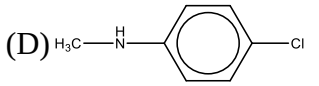
42. 1dentify X in the sequence given:



(A) 

(B) 

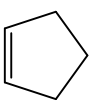
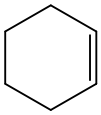
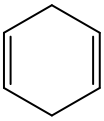
(C) 

(D) 

43. Select the rate law that corresponds to the data shown for the following reaction $A + B \longrightarrow C$

Expt. No.	[A]	[B]	Initial Rate
(i)	0.012	0.035	0.10
(ii)	0.024	0.070	0.80
(iii)	0.024	0.035	0.10
(iv)	0.012	0.070	0.80

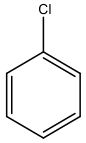
(A) Rate = $K[B]^3$ (B) Rate = $K[B]^4$
(C) Rate $= K[A][B]^3$ (D) Rate $= K[A]^2[B]^2$

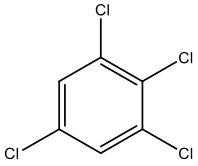
44. An alkene upon ozonolysis yield $CHO-CH_2-CH_2-CH_2-CHO$ only. The alkene is
(A) $CH_2=CH-CH_2-CH_2-CH_2-CH_2-CK_3$
(B) 
(C) 
(D) 

45. An inorganic compound gives off O_2 when heated, turns an acidic solution of Kl violet and reduces acidified $KMnO_4$. The compound is
(A) SO_3 (B) KNO_3
(C) H_2O_2 (D) All of these

CHEMISTRY Section – B (NTA)

46. Ionization energy of gaseous Na atoms is 495.5 kJmol^{-1} Calculate the lowest possible frequency of light that ionizes a sodium atom in terms of $x\times10^{15}s^{-1}$
($h = 6.626\times10^{-34}$ Js, $N_A = 6.022\times10^{23}$ mol^{-1})

47. The dipole moment of chlorobenzene 

is 1.5 4 Find the dipole moment of


48. If 3.01×10^{20} molecules are removed from 98 mg of H_2SO_4, then calculate the number of moles of H_2SO_4 left in terms of $x\times10^{-3}$.

49. 0.9g urea when dissolved in 45g water caused elevation of 0.17ºC in b.p. Calculate molal elevation boiling point constant of water.

50. In an amino acid, the carboxyl group ionises at $pK_{a_1} = 2.34$ and ammonium ion at $pK_{a_2} = 9.60$.. Find the isoelectric point (pI) of the amino acid

MATHEMATICS Section – A (MCQ's)

51. If $2\sec 2\alpha = \tan\beta + \cot\beta$ then one of the values of $(\alpha+\beta) =$
(A) π (B) $\frac{\pi}{2}$
(C) $\frac{\pi}{4}$ (D) None

52. The value of $\sum_{r=1}^{5} r\frac{{}^{n}C_{r}}{{}^{n}C_{r-1}} =$

(A) 5 (n-3) (B) 5 (n - 2)

(C) 5n (D) $5(2n-9)$

53. ${}^{14}C_7 + \sum_{i=1}^{3} {}^{17-i}C_6 =$

(A) ${}^{16}C_7$ (B) ${}^{17}C_7$

(C) ${}^{17}C_8$ (D) ${}^{16}C_8$

54. If $e^{y}(x+1)=1$, then, $\frac{d^2y}{dx^2}$ is

(A) $\frac{dy}{dx}$ (B) $\left(\frac{dy}{dx}\right)^2$

(C) $\left(\frac{dy}{dx}\right)^3$ (D) 1

55. Let ABC be a triangle with vertices at points $A(2,3,5), B(-1,3,2)$ and $C(\lambda,5,\mu)$ in three-dimensional space. If the median through A is equally inclined with the axes, then (λ,μ) is equal to:

(A) (10, 7) (B) (7, 5)

(C) (7, 10) (D) (5, 7)

56. The angle between the Two lines $\frac{x+1}{2}=\frac{y+3}{2}=\frac{z-4}{-1}$ & $\frac{x-4}{1}=\frac{y+4}{2}=\frac{z+1}{2}$ is

(A) $\cos^{-1}\left(\frac{4}{9}\right)$ (B) $\cos^{-1}\left(\frac{3}{9}\right)$

(C) $\cos^{-1}\left(\frac{2}{9}\right)$ (D) $\cos^{-1}\left(\frac{1}{9}\right)$

57. If f(x) is a continuous function and $\int_{x^2}^{x^4} t^3 f(t)dt = \sin 2\pi x$, then f(A) is equal to

(A) 1 (B) –1

(C) π (D) $-\pi$

58. If $(2,3,5)$ are ends of the diameter of a sphere $x^2+y^2+z^2-6x-12y-2z+20=0$. Then coordinates of the other end are

(A) $(4,9,-3)$ (B) $(4,3,5)$

(C) $(4,3,-3)$ (D) $(4,-3,9)$

59. $\int \frac{dx}{(x-\beta)\sqrt{(x-\alpha)(\beta-x)}}$ is

(A) $\frac{2}{\alpha-\beta}\sqrt{\frac{x-\alpha}{\beta-x}}+C$

(B) $\frac{2}{\alpha-\beta}\sqrt{(x-\alpha)(\beta-x)}+C$

(C) $\frac{\alpha-\beta}{2}(x-\alpha)\sqrt{\beta-x}$

(D) None of these.

60. Consider the following planes

$P: x+y-2z+7=0$

$Q: x+y+2z+2=0$

$R: 3x+3y-6z-11=0$

(A) P and R are perpendicular

(B) Q and R are perpendicular

(C) P and Q are parallel

(D) P and R are parallel

61. If $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+\ldots..+\infty=\frac{\pi^4}{90}$, then the value of $\frac{1}{1^4}+\frac{1}{3^4}+\frac{1}{5^t}+\ldots\ldots\infty$ is

(A) $\frac{\pi^4}{96}$ (B) $\frac{\pi^4}{45}$

(C) $\frac{89}{90}\pi^4$ (D) None of these

62. The domain of the function $f(x)=\exp\left(\sqrt{5x-3-2x^2}\right)$ is

(A) $[3/2,\infty)$ (B) $[1,3/2]$

(C) $(-\infty,1]$ (D) $(1,3/2)$

63. The value of the determinant $\begin{vmatrix} 1 & a & a^2 \\ \cos(n-1)x & \cos nx & \cos(n+1)x \\ \sin(n-1)x & \sin nx & \sin(n+1)x \end{vmatrix}$ is zero, if $a \neq 1$

(A) $\sin x = 0$ (B) $\cos x = 0$

(C) $a = 0$ (D) $\cos x = \frac{1+a^2}{2a}$

64. If $a = \cos\left(\frac{2\pi}{7}\right) + i\sin\left(\frac{2\pi}{7}\right)$, then the quadratic equation whose roots are $\alpha = a + a^2 + a^4$ and $\beta = a^3 + a^5 + a^6$, is

(A) $x^2 - x + 2 = 0$ (B) $x^2 + x - 2 = 0$

(C) $x^2 - x - 2 = 0$ (D) $x^2 + x + 2 = 0$

65. If $AB = 0$, then for the matrices $A = \begin{bmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix}$ and $B = \begin{bmatrix} \cos^2\varphi & \cos\varphi\sin\varphi \\ \cos\varphi\sin\varphi & \sin^2\varphi \end{bmatrix}$, $\theta - \varphi$ is

(A) an odd multiple of $\frac{\pi}{2}$

(B) an odd multiple of π

(C) an even multiple of $\frac{\pi}{2}$

(D) 0

66. If $f(x) = xe^{x(1-x)}, x \in R$, then $f(x)$ is

(A) decreasing on $[-1/2, 1]$

(B) decreasing on R

(C) increasing on $[-1/2, 1]$

(D) increasing on R

67. The area bounded by the curves $x = y^2$ and $x = \frac{2}{1+y^2}$ is

(A) $\pi - \frac{2}{3}$ (B) $\pi + \frac{2}{3}$

(C) $-\pi - \frac{2}{3}$ (D) None of these

68. An inverted cone is 10 cm in diameter and 10 cm deep. Water is poured into it at the rate of $4\text{cm}^3/\text{min}$. When the depth of water level is 6 cm, then it is rising at the rate

(A) $\frac{9}{4\pi}\text{cm}^3/\text{min}$. (B) $\frac{1}{4\pi}\text{cm}^3/\text{min}$.

(C) $\frac{1}{9\pi}\text{cm}^3/\text{min}$. (D) $\frac{4}{9\pi}\text{cm}^3/\text{min}$.

69. The equation of tangent to $4x^2 - 9y^2 = 36$ which is perpendicular to straight line $5x + 2y - 10 = 0$ is

(A) $5(y-3) = 2\left(x - \frac{\sqrt{117}}{2}\right)$

(B) $2y - 5x + 10 - 2\sqrt{18} = 0$

(C) $2y - 5x - 10 - 2\sqrt{18} = 0$

(D) None of these

70. $\int_{\log\sqrt{\pi/2}}^{\log\sqrt{\pi}} e^{2x}\sec^2\left(\frac{1}{3}e^{2x}\right)dx$ is equal to:

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$

(C) $\frac{3\sqrt{3}}{2}$ (D) $\frac{1}{2\sqrt{3}}$

MATHEMATICS Section – B (NTA)

71. If a_1, a_2, a_3, are positive numbers in GP. then the value of $\begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+1} & \log a_{n+2} & \log a_{n+3} \\ \log a_{n+2} & \log a_{n+3} & \log a_{n+4} \end{vmatrix}$ is _____.

72. The probability that in the random arrangement of the letters of the word 'UNIVERSITY', the Two I 's does not come together is. _____.

73. A point is selected at random from the interior of a circle. The probability that the point is close to the centre, than the boundary of the circle, is_____.

74. Three persons A, B, C throw a die in succession. The one getting 'six' wins. If a starts then the probability of B winning is_____.

75. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ coincide with the foci of the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$, then value of b^2 is_____.