



RANKRIDGE IIT JEE/NEET JUNIOR COLLEGE (LONGTERM) TELANGANA

STREAM: JR MPC
Time: 3:00 Hours

WEEKEND TEST-17

Date: 17-11-2025
Max Marks: 300

MATHEMATICS

: Errors and approximations, Rate of change

PHYSICS

: 1.Kinetic Theory of Gases 2.Gravitation (upto Acceleration due to Gravity and it's variation)

CHEMISTRY

: Thermochemistry

MATHEMATICS

SINGLE CORRECT ANSWER TYPE

This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases

1. If $f(x) = \log x, x = 2, \delta x = 0.02$, then

$$df =$$

$$(A) \log(1.01) \quad (B) 0.01 \quad (C) -\log(1.01) \quad (D) -0.01$$

2. The approximate value of $(1.0002)^{3000}$ is

$$(A) 1.2 \quad (B) 1.4 \quad (C) 1.6 \quad (D) 1.8$$

3. The approximate value of $\sin 46^\circ$ given that $1^\circ = 0.01745$ radian is

$$(A) 1.0349 \quad (B) 0.7193 \quad (C) 0.4849 \quad (D) 1.000558$$

4. If there is an error of 0.05 cm while measuring the side of an equilateral triangle as 10 cms, then the percentage error in area is

$$(A) 5 \quad (B) 4 \quad (C) 1 \quad (D) 0.5$$

5. In a cube the percentage increase in the side is 1. The percentage increase in volume of cube is

$$(A) 2 \quad (B) 1/2 \quad (C) 1/3 \quad (D) 3$$

6. A circular hole of 4 mm in diameter and 12 mm deep in a metal block is re bored to increase the diameter to 4.12 mm, then the amount of metal removed is approximately

$$(A) 2.88 \pi \text{ mm}^3 \quad (B) 3.99 \pi \text{ mm}^3$$

SYLLABUS

: Errors and approximations, Rate of change

: 1.Kinetic Theory of Gases 2.Gravitation (upto Acceleration due to Gravity and it's variation)

CHEMISTRY

: Thermochemistry

- (C) $3.79 \pi \text{ mm}^3$ (D) $3.725 \pi \text{ mm}^3$

7. In measuring the vertical angle of the sector of a circle of radius 30 cms, an error of 1° is made. The error in the area of the sector is

$$(A) 2.5 \pi \text{ sq.cm} \quad (B) 25 \pi \text{ sq.cm} \quad (C) 3 \pi \text{ sq.cm} \quad (D) 30 \pi \text{ sq.cm}$$

8. Let a kind of bacteria grow following the function $f(t) = r^t$, t given in seconds. if the rate of growth of the bacteria after t_0 seconds is 4000/second, then to

$$(A) 0 \quad (B) 10 \quad (C) 20 \quad (D) 30$$

9. For a particle moving on a straight line it is observed that the distance 'x' at time 't' is given by $x = 6t - (1/2)t^2$. The maximum velocity during the motion is

$$(A) 3 \text{ units/sec.} \quad (B) 6 \text{ units/sec.} \quad (C) 9 \text{ units/sec.} \quad (D) 12 \text{ units/sec.}$$

10. If a particle moves along a line by $S = \sqrt{1+t}$; then its acceleration is proportional to _____ of its velocity at the instant

$$(A) \text{ square} \quad (B) \text{ cube} \quad (C) \text{ double} \quad (D) \text{ triple}$$

11. The displacement of a body of mass 100kg in a rectilinear motion is given by the formulae $S = 2t^2 + 3t + 1$. The K.E of the body 5 sec after the start is

$$(A) 56,000 \quad (B) 26,450 \quad (C) 20,000 \quad (D) 35,000$$

12. At the point A(2, 5) on the curve $y = x^3 - 2x + 1$ the gradient of the curve is increasing _____ times as fast as x

$$(A) 3 \quad (B) 10 \quad (C) 12 \quad (D) 5$$

13. A point is moving along the cubical parabola $(2y = x^2)$. The rate of ordinate is less than the rate of abscissae when
 (A) $x < 2$ or $x > 2$ (B) $|x| < 2$
 (C) $-2 < x < 2$ (D) $x \neq 4$
14. The side of a cube is equal to the radius of a sphere. If the side and the radius increases at the same rate then the relation between the rate of change of surface areas of the cube and sphere is
 (A) ∞ (B) 2
 (C) 1 (D) 2
15. Water is being poured into the inverted conical vessel at the rate of $1.5 \text{ cubic meter per minute}$. Its depth is always equal to twice its radius. The level of water is rising at the rate of $\frac{3}{8\pi} \text{ meter per minute}$ when
 its depth is
 (A) 1 mt (B) 2 mt
 (C) 3 mt (D) 4 mt

16. If the semivertical angle of a cone is 45° , Then the rate of change of its volume is
 (A) The lateral surface area times the rate of change of r
 (B) The base area times, the rate of change of r
 (C) The base area times, the rate of change of r
 (D) The lateral surface area times of the rate of change in h
17. A man of height 2 meters walks at a uniform speed of 7 meters per minute away from a lamp post of height 9 meters. The rate (in meters per minute) at which the length of his shadows increases is
 (A) 2 (B) $5/2$
 (C) 3 (D) $7/2$
18. A water tank has the shape of an inverted right circular cone, whose semi-vertical angle is $\tan^{-1}\left(\frac{1}{2}\right)$. Water is poured into it at a constant rate of $5 \text{ cubic meter per minute}$. Then the rate (in m^3/min) at which the level of water is rising at the instant when the depth of water in the tank is 10m , is:
 (A) $1/10\pi$ (B) $1/15\pi$
 (C) $1/5\pi$ (D) $2/\pi$

19. A spherical iron ball of radius 10cm is coated with a layer of ice of uniform thickness that melts at a rate of $50\text{c} * \text{m}^{-3}/\text{min}$. When the thickness of the ice 5cm , then the rate at which the thickness (in cm/min) of the ice decreases, is
 (A) $\frac{5}{6\pi}$ (B) $\frac{1}{10\pi}$
 (C) $\frac{1}{6\pi}$ (D) 36π
20. A point P is moving with uniform velocity v along a line AB . 'O' is a point on the line perpendicular drawn to AB at A and at a distance ' r ' from it. The angular velocity of P about 'O' is
 (A) $\frac{Lv}{OP}$ (B) $\frac{Lv}{Op^2}$
 (C) $\frac{Op}{Lv}$ (D) $\frac{Op^2}{Lv}$

NUMERICAL VALUE TYPE

Section-II contains 5 Numerical Value Type questions.
 Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases

21. The side of an equilateral triangle is 5 Units. In measuring the side, an error of 0.05 units is made. Then the percentage error in measuring the area of the triangle is \underline{Q} .
22. If there is an error of 0.05 cm in the side of a cube 10 cm then the error in its surface area is (in sq.cm)
 23. A particle moves according to the law $S = 3t^3 - 9t^2 + 18t + 12$. The velocity when the acceleration is zero is \underline{Q} .
 24. The displacement S of a particle at time t ($0 < t < \pi$) is given by $S = 3\sin 2t + 6\cos t$. Then the acceleration for the value of t for which its velocity is zero is \underline{Q} .
 25. A spherical balloon is being inflated at the rate of 35cc/min . The rate of increase in the surface area (in cm^2/min) of the balloon when its diameter is 14 cm , is \underline{Q} .

PHYSICS

SINGLE CORRECT ANSWER TYPE

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below the earth's surface (Given $R = 6400$ km) _____ in ms^{-2} .

CHEMISTRY

(SINGLE CORRECT ANSWER TYPE)

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51. Of the following an endothermic reaction is

- (A) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (B) $\text{C}_{(\text{graphite})} + \text{H}_2\text{O}_{(\text{g})} \rightarrow \text{CO}_{(\text{g})} + \text{H}_2\text{O}$
- (C) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- (D) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$

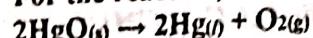
52. When potassium chloride is dissolved in water

- (A) Entropy increases
- (B) Entropy decreases
- (C) Entropy increases and then decreases
- (D) Free energy increases

53. For the process $\text{CO}_{2(\text{s})} \rightarrow \text{CO}_{2(\text{g})}$

- (A) Both ΔH and ΔS are +ve
- (B) ΔH is - ve, ΔS is +ve
- (C) ΔH is +ve, ΔS is - ve
- (D) Both ΔH and ΔS are - ve

54. For the reaction,



- (A) $\Delta H > 0$ & $\Delta S < 0$

- (B) $\Delta H > 0$ & $\Delta S > 0$

- (C) $\Delta H < 0$ & $\Delta S < 0$

- (D) $\Delta H < 0$ & $\Delta S > 0$

55. The value of ΔS is negative for the process

- (A) Burning of rocket Fuel

- (B) Dissolution of sugar

- (C) Sublimation of Iodine

- (D) Freezing of water

56. The enthalpy change for the process

- $\text{C}_{(\text{graphite})} \rightarrow \text{C}_{(\text{g})}$; $\Delta H = +x \text{ KJ}$ represents enthalpy of

- (A) Fusion

- (C) Combustion

- (B) Sublimation

- (D) Vapourisation

57. $\text{H}_2(g) + \text{I}_2(g) \rightarrow 2\text{HI}(g)$, $\Delta H = 51.9 \text{ KJ}$.

- According to this, heat of formation of HI is

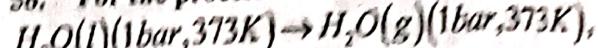
- (A) 51.9 KJ

- (C) -25.95 KJ

- (B) -51.9 KJ

- (D) 25.95 KJ

58. For the process



the correct set of thermodynamic parameters is

- (A) $\Delta G = 0, \Delta S = +\text{ve}$

- (B) $\Delta G = 0, \Delta S = -\text{ve}$

- (C) $\Delta G = +\text{ve}, \Delta S = 0$

- (D) $\Delta G = -\text{ve}, \Delta S = +\text{ve}$

59. The entropy change for the conversion of 1 mole of α -tin (at 13°C , 1 atm) to 1 mole of β -tin (13°C , 1 atm) if the enthalpy of transition is $2.095 \text{ KJ mol}^{-1}$

- (A) $7.32 \text{ J mol}^{-1} \text{ K}^{-1}$ (B) $14.62 \text{ J K mol}^{-1}$

- (C) $56.1 \text{ mol}^{-1} \text{ K}^{-1}$ (D) 0

60. When 6 g carbon is burnt in a sufficient amount of oxygen, the heat evolved is x KJ. The heat of combustion of carbon is

- (A) $-x \text{ KJ}$ (B) $-2x \text{ KJ}$

- (C) $-4x \text{ KJ}$ (D) $-8x \text{ KJ}$

61.

	LIST-I	LIST-II
A.	$\text{C}_{(\text{s, graphite})} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$	1. ΔH° combustion
B.	$\text{C}_{(\text{s, graphite})} \rightarrow \text{C}_{(\text{g})}$	2. ΔH° formation
C.	$\text{CO}_{(\text{g})} + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$	3. ΔH° atomization
D.	$\text{CH}_4(\text{g}) \rightarrow \text{C}_{(\text{g})} + 4\text{H}_{(\text{g})}$	4. ΔH° sublimation

The correct match is

A B C D

- (A) 1 2 3 4

- (B) 2 4 1 3

- (C) 2 3 1 4

- (D) 1 3 2 4

62.

	LIST-I	LIST-II
A.	$\text{HNO}_3 + \text{KOH}$	1. -55.22 KJ
B.	$\text{NH}_4\text{OH} + \text{CH}_3\text{COOH}$	2. -58.7 KJ
C.	$\text{CH}_3\text{COOH} + \text{NaOH}$	3. -57.3 KJ
		4. -51.46 KJ

The correct match is

A B C D

- (A) 1 2 3 4

- (B) 3 4 1 2

- (C) 3 4 1 2

- (D) 3 2 1

63.

LIST-I (sign ΔH and ΔS)			LIST-II
A.	- & -	1.	Spontaneous only at low tem-perature
B.	- & +	2.	Spontaneous only at high tem-perature
C.	+ & +	3.	Spontaneous at all temperature
D.	+ & -	4.	Non-Spontaneous at all tem-perature

The correct match is

C_8H_{18} respectively are -390, -240, and +160 KJ/mole.

69. A coffee cup calorimeter initially contains 125g of water at a temperature of 24.2°C . After adding 10.5gm KBr temperature becomes 21.1°C . The heat of solution is

(A) 85J/g (B) 110J/g
(C) 270J/g (D) 167J/g

70. The change in enthalpy when HF reacts with NaOH in dilute conditions is

(A) 57.32KJ (B) $>57.32\text{KJ}$
(C) $<57.32\text{KJ}$ (D) None of these

(NUMERICAL VALUE TYPE)

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71. The enthalpy of formation $NH_3(g)$ is 46 KJ mol⁻¹. The heat of the reaction, $2NH_3(g) \rightarrow N_{2(g)} + 3H_{2(g)}$ is 92 KJ.

72. Heat of combustion of $H_{2(g)}$ = -241.8 KJ / mol
 $C_{(s)}$ = -393.5 KJ / mol;
 $C_2H_5OH(l)$ = -1234.7 KJ / mol. Hence, heat of formation of $C_2H_5OH(l)$ is _____ KJ/mol.

73. Heat of combustion of benzene is 718 K.cals. When 39 gms of benzene undergoes combustion, the heat liberated is 359 K.cal.

74. Human body requires 2370 K.cal of energy daily. If the heat of combustion of glucose is 790 K.cal/mole the amount of glucose required for daily consumption is 540 g.

75. Heat evolved in the reaction $H_2 + Cl_2 \rightarrow 2HCl$ is 182 kJ Bond energies H-H=430 kJ/mole, Cl-Cl=242 kJ/mole. The H-Cl bond energy is 679 KJ/mole.

* * * * *

26. Let 'A' be the area swept by the line joining the earth and the sun during Feb 2007. The area swept by the same line during the first week of that month is
 (A) $A/4$ (B) $7A/29$
 (C) A (D) $7A/30$
27. The period of revolution of a planet around the sun in a circular orbit is same as that of period of similar planet revolving around a star of twice the radius of first orbit and 'M' is the mass of the sun and mass of star is
 (A) $2M$ (B) $4M$
 (C) $8M$ (D) $16M$
28. A planet revolves round the sun in an elliptical orbit of semi minor and semi major axes x and y respectively. Then the time period of revolution is proportional to
 (A) $(x+y)^{\frac{3}{2}}$ (B) $(y-x)^{\frac{3}{2}}$
 (C) $x^{\frac{3}{2}}$ (D) $y^{\frac{3}{2}}$
29. Three uniform spheres each of mass m' and diameter D are kept in such a way that each touches the other two, then magnitude of the gravitational force on any one sphere due to the other two is
 (A) $\frac{3Gm^2}{D^2}$ (B) $\frac{2\sqrt{3}Gm^2}{D^2}$
 (C) $\frac{\sqrt{3}Gm^2}{4D^2}$ (D) $\frac{\sqrt{3}Gm^2}{D^2}$
30. A 3 kg mass and a 4 kg mass are placed on x and y axes at a distance of 1 metre from the origin and a 1 kg mass is placed at the origin. Then the resultant gravitational force on 1 kg mass is
 (A) $7G$ (B) G
 (C) $5G$ (D) $3G$
31. If mass of the planet is 10% less than that of earth and radius of the planet is 20% greater than that of earth then the weight of 40kg person on that planet is
 (A) 10 kg wt (B) 25 kg wt
 (C) 40 kg wt (D) 60 kg wt
32. The value of acceleration due to gravity on the surface of earth is x . At an altitude of ' b ' from the surface of earth, its value is y . If R is the radius of earth, then the value of b is

$$(A) \left(\sqrt{\frac{x}{y}} - 1 \right) R \quad (B) \left(\sqrt{\frac{y}{x}} - 1 \right) R$$

$$(C) \sqrt{\frac{y}{x}} R \quad (D) \sqrt{\frac{x}{y}} R$$

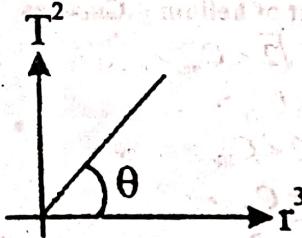
33. The acceleration due to gravity at the poles is 10 ms^{-2} and equatorial radius is 6400km for the earth. Then the angular velocity of rotation of the earth about its axis so that the weight of a body at the equator reduces to 75% is

$$(A) \frac{1}{1600} \text{ rads}^{-1} \quad (B) \frac{1}{800} \text{ rads}^{-1}$$

$$(C) \frac{1}{400} \text{ rads}^{-1} \quad (D) \frac{1}{200} \text{ rads}^{-1}$$

34. If the mass of one particle is increased by 50% and the mass of another particle is decreased by 50%, the force between them
 (A) decreases by 25% (B) decreases by 75 %
 (C) increases by 25% (D) does not change

35. If a graph is plotted between T^2 and r^3 for a planet then, its slope will be



$$(A) \frac{4\pi^2}{GM} \quad (B) \frac{GM}{4\pi^2}$$

$$(C) 4\pi GM \quad (D) \text{Zero}$$

36. Two particles each of mass 'm' are placed at A and C are such AB=BC=L. The gravitational force on the third particle placed at D at a distance L on the perpendicular bisector of the line AC is

$$(A) \frac{Gm^2}{L^2} \text{ along } BD \quad (B) \frac{Gm^2}{\sqrt{2}L^2} \text{ along } DB$$

$$(C) \frac{Gm^2}{L^2} \text{ along } AC \quad (D) \frac{Gm^2}{L^2} \text{ along } BD$$

37. The difference in the value of 'g' at poles and at a place of latitude 45° is

$$(A) R\omega^2 \quad (B) \frac{R\omega^2}{2}$$

$$(C) \frac{R\omega^2}{4} \quad (D) \frac{R\omega^2}{3}$$

38. The average kinetic energy of a gas at -23°C and 75cm pressure is 5×10^{-14} erg for H_2 . The mean kinetic energy of the O_2 at 227°C and 150 cm pressure will be
 (A) 80×10^{-14} erg (B) 20×10^{-14} erg
 (C) 40×10^{-14} erg (D) 10×10^{-14} erg
39. The molecules of a given mass of a gas have a rms velocity of 200 m/sec at 27°C and $0.5 \times 10^5 \text{ N/m}^2$ pressure. When the temperature is 127°C and pressure is $0.5 \times 10^5 \text{ N/m}^2$, the rms velocity in m/sec will be
 (A) $\frac{100\sqrt{2}}{3}$ (B) $100\sqrt{2}$
 (C) $\frac{400}{\sqrt{3}}$ (D) 400
40. In the two vessels of same volume, atomic hydrogen and helium at pressure 1 atm and 2 atm are filled. If temperature of both the sample is same then average speed of hydrogen atoms $\langle C_H \rangle$ will be related to that of helium $\langle C_{He} \rangle$ as
 (A) $\langle C_H \rangle = \sqrt{2} \langle C_{He} \rangle$
 (B) $\langle C_H \rangle < \langle C_{He} \rangle$
 (C) $\langle C_H \rangle = 2 \langle C_{He} \rangle$
 (D) $\langle C_H \rangle = \frac{\langle C_{He} \rangle}{2}$
41. The root mean square speed of oxygen molecule at a certain temperature is 600 m/s. If the temperature is doubled and oxygen gas dissociates into atomic oxygen, the rms speed will become
 (A) 120 m/s (B) 150 m/s
 (C) 1200 m/s (D) 600 m/s
42. The temperature of an ideal gas is increased from 120K to 480K. If at 120K, the root mean square speed of the gas molecules is v, then at 480K it will be
 (A) $4v$ (B) $2v$
 (C) $\frac{v}{2}$ (D) $\frac{v}{4}$
43. At room temperature the rms speed of oxygen molecules is V. The rms speed of the nitrogen molecules at the same temperature.
 (A) $V\sqrt{\frac{7}{8}}$ (B) $V\sqrt{\frac{8}{7}}$
44. Two vessels having equal volume contain molecular hydrogen at one atmosphere and helium at two atmospheres respectively. What is the ratio of rms speeds of hydrogen molecule to that of helium molecule if both the samples are at same temperature
 (A) $(V_{\text{rms}})_{\text{H}_2} = (V_{\text{rms}})_{\text{He}}$
 (B) $(V_{\text{rms}})_{\text{H}_2} = \sqrt{2}(V_{\text{rms}})_{\text{He}}$
 (C) $(V_{\text{rms}})_{\text{H}_2} = \sqrt{2}(V_{\text{rms}})_{\text{He}}$
 (D) $(V_{\text{rms}})_{\text{H}_2} = 2(V_{\text{rms}})_{\text{He}}$
45. Four molecules of a gas are having speed 1, 4, 8 and 16. The root mean square velocity of the gas molecules is
 (A) 7.25 m/s (B) 52.56 m/s
 (C) 84.25 m/s (D) 9.2 m/s

NUMERICAL VALUE TYPE)

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46. Calculate the pressure ($\text{in } 10^5 \text{ N/m}^2$) exerted by a mixture of 8 g of oxygen, 14 g of nitrogen, and 22g of carbon dioxide in a container of 30 litres at a temperature of 27°C .
47. The root mean square speed of molecules of a given mass of a gas at 27°C and 1 atmosphere pressure is 200 ms^{-1} . The root mean square speed of molecules of the gas at 127°C and 2 atmosphere pressure is $\frac{x}{\sqrt{3}} \text{ ms}^{-1}$. The value of x will be 400.
48. The height at which the weight of a body becomes $1/16^{\text{th}}$ its weight on the surface of earth (radius R) is R.
49. If the density of a small planet is the same as that of earth, while the radius of the planet is 0.2 times that of the earth the gravitational acceleration on the surface of the planet is $x \times 10^{-1} \text{ g}$ where $x =$ _____.
50. Assuming earth to be a sphere of a uniform density, what is the value of gravitational acceleration in a mine 100km



BEST OF LUCK
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WEEKEND TEST-17

Date: 17-11-2025
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KEY SHEET

MATHEMATIC

1) B	2) C	3) B	4) C	5) D	6) A	7) A	8) B	9) B	10) B
11) B	12) C	13) C	14) A	15) D	16) C	17) A	18) C	19) B	20) B
21) 2	22) 6	23) 9	24) 0	25) 10					

PHYSICS

26) A	27) C	28) D	29) D	30) C	31) B	32) A	33) A	34) A	35) A
36) B	37) B	38) D	39) C	40) C	41) C	42) B	43) B	44) C	45) D
46) 3	47) 400	48) 3	49) 2	50) 9					

CHEMISTRY

51) B	52) A	53) A	54) B	55) D	56) B	57) D	58) A	59) D	60) B
61) B	62) C	63) A	64) C	65) A	66) A	67) A	68) A	69) D	70) B
71) 92	72) 278	73) 359	74) 540	75) 427					