

# MELUHA INTERNATIONAL SCHOOL

## HYDERABAD

SR MPC  
Time: 3 Hours

(UT1+UT2) CUM TEST-1

Date: 25-04-2020  
Max. Marks: 300 M

### IMPORTANT INSTRUCTIONS:-

### JEE MAIN MODEL

#### MATHS

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 01 – 20)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 21 – 25)	Questions with Numerical Answer Type (+/- Decimal Numbers)	4	0	5	20
Total				25	100

#### PHYSICS

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 26 – 45)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 46 – 50)	Questions with Numerical Answer Type (+/- Decimal Numbers)	4	0	5	20
Total				25	100

#### CHEMISTRY

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 51 – 70)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 71 – 75)	Questions with Numerical Answer Type (+/- Decimal Numbers)	4	0	5	20
Total				25	100





## PHYSICS

**SYLLABUS:** Kinetics (1D and 2D), Laws of motion, Work, power energy and Rotational motion, Gravitation, Oscillations and waves

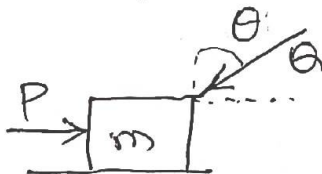
### SECTION – I

#### (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.

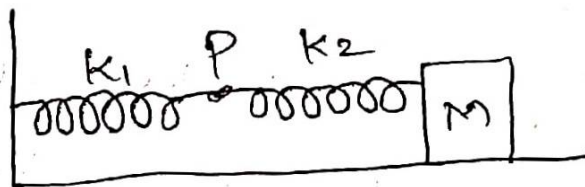
**Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.**

26. A bullet in a rifle accelerates uniformly from rest at  $a=70000\text{m/s}^2$ . If the velocity of the bullet as it leaves the (barrel) is  $500\text{m/s}$ , how long is the rifle barrel?  
A) 1.12 m                      B) 1.79 m                      C) 2.85 m                      D) 2.79 m
27. A race car accelerates uniformly from  $18.5\text{ m/s}$  to  $46.1\text{ m/s}$  in  $2.47$  seconds. Determine the acceleration of the car and the distance travelled?  
A)  $a=11.2\text{ m/s}^2$                       B)  $a=2.11\text{ m/s}^2$                       C)  $a=11.2\text{ m/s}^2$                       D)  $a=1.1\text{ m/s}^2$   
D=88.9 m                      d=90.8                      d=79.8m                      d=100.8m
28. Displacement ( $y$ ) of the particle is given by  $y = 2t + t^2 - 2t^3$ , the velocity of the particle when acceleration is zero is given by  
A)  $\frac{5}{2}$                       B)  $\frac{9}{4}$                       C)  $\frac{13}{6}$                       D)  $\frac{17}{8}$
29. A particle is moving with velocity  $\vec{V} = k(y\hat{i} + x\hat{j})$  where  $k$  is a constant. The general equation for its path is:  
A)  $y^2 = x^2 + \text{constant}$                       B)  $y = x^2 + \text{constant}$                       C)  $y^2 = x + \text{constant}$                       D)  $xy = \text{constant}$
30. A jet plane starts from rest on the runway and accelerates for takeoff at  $2.30\text{ m/s}^2$ . It has two jet engines, each of which exerts a thrust  $1.4 \times 10^5\text{N}$ . Weight of the plane is  
A)  $1.2 \times 10^6\text{ N}$                       B)  $3.2 \times 10^6\text{N}$                       C)  $2.2 \times 10^4\text{N}$                       D)  $10 \times 10^3\text{N}$
31. A block of mass  $m$ , lying on a horizontal plane is acted upon by a horizontal force 'P' and another force 'Q', inclined at an angle  $\theta$  to be vertical. The block will remain in equilibrium if the coefficient of friction between it and the surface is (assume  $P>Q$ )



- A)  $\frac{(P \sin \theta - Q)}{(mg - \cos \theta)}$                       B)  $\frac{(P - Q \sin \theta)}{(mg + Q \cos \theta)}$                       C)  $\frac{(P \cos \theta + Q)}{(mg - Q \cos \theta)}$                       D)  $\frac{(P + Q \sin \theta)}{(mg + Q \cos \theta)}$
32. A lift is moving upwards with a uniform velocity 'V' in which a block of mass  $m$  is lying. The force offered by the block, when coefficient of friction is  $\mu \geq 0.5$ , will be  
A) zero                      B)  $\frac{mg}{2}$                       C)  $mg$                       D)  $2mg$
33. A particle of mass 'm' is moving in a circular path of constant radius 'r' such that its centripetal acceleration ' $a_c$ ' is varying with time 't' as  $a_c = k^2 r t^2$ , where  $k$  is a constant. The power delivered to the particle by the force acting on it is  
A) zero                      B)  $mk^2 r^2 t^2$                       C)  $mk^2 r^2 t$                       D)  $mk^2 r t$

34. The potential energy of a particle of mass 'm' free to move along the x-axis is given by  $U = \frac{kx^2}{2}$  for  $x < 0$  and 'U'=0 for  $x \geq 0$  (x denotes the x- coordinate of the particle and k is a positive constant). If the total mechanical energy of the particle is E, then its speed at  $x = -\sqrt{\frac{2E}{k}}$  is \_\_\_\_
- A) zero                      B)  $\sqrt{\frac{2E}{m}}$                       C)  $\sqrt{\frac{E}{m}}$                       D)  $\sqrt{\frac{3E}{2m}}$
35. A 1 kg stone at the end of 1 m long string is whirled in a vertical circle at a constant speed of 4 m/s. The tension in the string is 6 N when the stone is
- A) At the bottom of the circle                      B) Half way down  
C) At the top of the circle                      D) None of the above
36. A bob of mass 'm' attached to an inextensible string of length 'l' is suspended from a vertical support. The bob rotates in a horizontal circle with an angular speed  $\omega$  rad/s about the vertical. About the point of suspension.
- A) Angular momentum is conserved  
B) Angular momentum changes in magnitude but not in direction  
C) Angular momentum changes in indirection but not in magnitude  
D) Angular momentum changes in both indirection & magnitude
37. If the radius of the earth were to shrink by one percent, its mass remaining the same, the acceleration due to gravity on the Earth's surface would
- A) Decrease                      B) Remain unchanged                      C) Increase                      D) None
38. A simple pendulum has a time period 'T<sub>1</sub>' when on the earth's surface, and 'T<sub>2</sub>' when taken to a height 'R' above the earth's surface, where 'R' is the radius of the earth. The value of  $\frac{T_2}{T_1}$  is \_\_\_\_
- A) 1                      B)  $\sqrt{2}$                       C) 4                      D) 2
39. A binary star system consists of two stars 'A' and 'B' which have time periods T<sub>A</sub> and T<sub>B</sub>, radii R<sub>A</sub> and R<sub>B</sub> and masses M<sub>A</sub> and M<sub>B</sub> then
- A) If T<sub>A</sub> > T<sub>B</sub> Then R<sub>A</sub> > R<sub>B</sub>                      B) If T<sub>A</sub> < T<sub>B</sub> Then M<sub>A</sub> > M<sub>B</sub>  
C)  $\left[\frac{T_A}{T_B}\right]^2 = \left[\frac{R_A}{R_B}\right]^5$                       D) T<sub>A</sub> = T<sub>B</sub>
40. Imagine a light planet revolving around a very massive star in a circular orbit of radius R with a period of revolution T. If the gravitational force of attraction between the planet and the star is proportional to  $R^{\frac{5}{2}}$ , Then
- A)  $T^2 \propto R^3$                       B)  $T^2 \propto R^{\frac{7}{2}}$                       C)  $T^2 \propto R^{\frac{3}{2}}$                       D)  $T^2 \propto R^{\frac{7}{3}}$
41. Due to some force F<sub>1</sub> a body oscillates with period  $\frac{4}{5}$  sec and due to other force F<sub>2</sub> oscillates with period  $\frac{3}{5}$  sec. If both forces act simultaneously the new period will be \_\_\_\_
- A) 0.72 sec                      B) 0.64 sec                      C) 0.48 sec                      D) 0.36 sec
42. Which of the following function represents a simple harmonic oscillation?
- A)  $\sin \omega t - \cos \omega t$                       B)  $\sin^2 \omega t$                       C)  $\sin \omega x + \sin 2 \omega t$                       D)  $\sin \omega x - \sin 2 \omega t$
43. A mass M is suspended from a spring of negligible mass. This system has time period T. when mass M is loaded with one more mass m=16 g, new time period is  $\frac{5T}{3}$ , Find the value of M(ing)
- A) 7                      B) 8                      C) 9                      D) 10
44. The mass M shown in the figure oscillates in simple harmonic motion with amplitude A. The amplitude of the point 'P' is



- A)  $\frac{K_1 A}{K_2}$       B)  $\frac{K_2 A}{K_1}$       C)  $\frac{K_1 A}{K_1 + K_2}$       D)  $\frac{K_2 A}{K_1 + K_2}$

45. In the case of SHM, if the particle is at the mean position, then the particle is in  
 A) Stable equilibrium      B) Unstable equilibrium  
 C) Neutral equilibrium      D) None of these

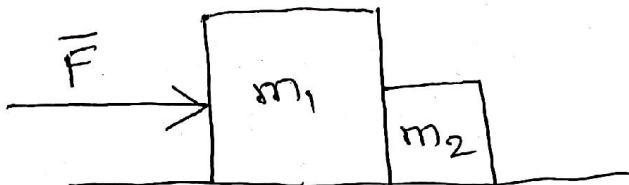
### SECTION-II

#### (Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical values comprising of positive or negative decimal numbers. 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 in all other cases.

46. Two blocks are in contact on frictionless table. A horizontal force is applied to one block, as shown in the below figure. The force of contact between the two blocks, if  $m_1=2.2$  kg,  $m_2=1$  kg and  $F=3.2$  N is \_\_\_\_\_



47. A bus can be stopped by applying a retarding force 'F' when it is moving speed 'V' on a level road. The distance covered by it before coming to rest is 'S'. If the load of the bus increases by 50% because of passengers, for the same speed and same retarding force, the distance covered by the bus to come to rest shall be \_\_\_\_\_
48. A Tube of length 'L' is filled completely with an incompressible liquid of mass 'M' and closed at both the ends. The tube is then rotated in a horizontal plane about one of its ends with a uniform angular velocity ' $\omega$ '. The force exerted by the liquid at the other end is  $KM \omega^2 L$ , where  $k=$  \_\_\_\_\_
49. If the distance between the earth and the sun were half its present value, the number of days in a year \_\_\_\_\_
50. A spring of force constant K is cut into two pieces such that one piece is double the length of the other. Then long piece will have a force constant of "x k", where  $x =$  \_\_\_\_\_

## CHEMISTRY

**SYLLABUS:** Periodic classification of elements & periodicity, Chemical bonding, Alkali metals & alkaline earth metals, 13<sup>th</sup>, 14<sup>th</sup> group elements, Environmental chemistry, Hydrogen and its compounds

### SECTION – I (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 if not correct.**

51. The lanthanide contraction is responsible for the fact that  
A) Zr and Y have about the same radius.                      B) Zr and Nb have similar oxidation state  
C) Zr and Hf have about the same radius                      D) Zr and Zn have the same oxidation state
52. The d-orbital involved in  $sp^3d$ , hybridization is  
A)  $dx^2 - y^2$                       B)  $dxy$                       C)  $dz^2$                       D)  $dzx$
53. The solubility of alkali metal hydroxides follows the order  
A)  $LiOH < NaOH < KOH < CsOH$                       B)  $LiOH > NaOH > KOH > RbOH > CsOH$   
C)  $LiOH > CsOH > RbOH > NaOH > KOH$                       D) None
54. Among the following the paramagnetic compound is  
A)  $Na_2O_2$                       B)  $O_3$                       C)  $N_2O$                       D)  $KO_2$
55. Calculate the hardness of water sample which contain 0.001 mole of  $MgSO_4$  dissolved per lit of water.  
A) 300 ppm                      B) 200 ppm                      C) 100 ppm                      D) 400 ppm
56. Black ash is  
A)  $CaS + NaHCO_3$                       B)  $CaSO_4 + Na_2CO_3$                       C)  $CaSO_4 + NaHCO_3$                       D)  $CaS + Na_2CO_3$
57.  $BCl_3 + LiAlH_4 \rightarrow A + LiCl + AlCl_3$   
 $A + H_2O \rightarrow B + H_2$   
 $B \xrightarrow{\text{Red heat}} C$  In this reaction sequence A, B and C compounds respectively are  
A)  $B_2H_6, B_2O_3, B$                       B)  $B_2H_6, H_3BO_3, B_2O_3$   
C)  $B_2H_6, H_3BO_3, B$                       D)  $HB_4, H_3BO_3, B_2O_3$
58. Lead pencil contains  
A) Lead                      B) Lead sulphide                      C) Graphite and clay                      D) Ferrous sulphide
59. The TLV of four pollutants A, B, C and D are 9 PPM, 10 PPM, 100 PPM and 500 PPM respectively. The most toxic is  
A) A                      B) B                      C) C                      D) D
60. What is the reagent used for testing fluoride ion in water.  
A) Zirconium Alizarin-s                      B) Quinalizarin                      C) Phendphathalein                      D) Benzene
61. Which of the following pairs of metal is purified by Van Arkel method?  
A) Zr and Ti                      B) Ga and In                      C) Ni and Fe                      D) Ag and Au
62. The percentage of carbon in steel is approximately  
A) 1%                      B) 3%                      C) 2%                      D) 10%
63. Extra pure  $N_2$  can be obtained by heating  
A)  $NH_3$  with  $CuO$                       B)  $NH_4NO_3$                       C)  $(NH_4)_2Cr_2O_7$                       D)  $Ba(N_3)_2$
64. Acid that contains S-O-S linkage is  
A)  $H_2S_2O_7$                       B)  $H_2S_2O_5$                       C)  $H_2S_2O_6$                       D)  $H_2S_2O_4$
65. The molecule having one  $P^\pi - P^\pi$  and two  $P^\pi - d^\pi$  bonds is  
A)  $SO_2$                       B)  $SO_3$                       C)  $CO_2$                       D)  $N_2$
66. The highest oxidation state of fluorine is  
A) -1                      B) +1                      C) 0                      D) +2

- 
67. A radioactive element X decays to give two inert gases.  
 A)  ${}_{92}^{238}\text{U}$                       B)  ${}_{88}^{226}\text{Ra}$                       C)  ${}_{90}^{232}\text{Th}$                       D)  ${}_{89}^{227}\text{Ac}$
68. The relative acidic strength, stability and oxidizing agent of oxy acids of chlorine are  
 A)  $\text{HClO}_4 > \text{HClO}_3 > \text{HClO}_2 > \text{HOCl}$                       B)  $\text{HClO}_4 > \text{HClO}_2 > \text{HClO}_3 > \text{HOCl}$   
 C)  $\text{HOCl} < \text{HClO}_2 > \text{HClO}_3 > \text{HClO}_4$                       D)  $\text{HClO}_3 > \text{HClO}_2 > \text{HClO}_4 > \text{HOCl}$
69. Which is used in cancer chemotherapy?  
 A) Cis-platin                      B) Zeise's salt                      C) Both A & B                      D) None of these
70. The Equilibrium  $\text{Cr}_2\text{O}_7^{2-} \rightleftharpoons 2\text{CrO}_4^{2-}$   
 A) Exists in acidic medium                      B) Exists in basic medium  
 C) Exists in neutral medium                      D) Never exists

## SECTION-II

### (Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical value comprising of positive or negative decimal numbers. 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 in all other cases.**

---

71. The ionization energy of lithium is  $500 \text{ kJ mol}^{-1}$ . The amount of energy required to convert 70 mg of Lithium atoms in gaseous state into  $\text{Li}^+$  ions is
72. In  $\text{PO}_4^{3-}$  ion, the formal charge on the oxygen atom of  $\text{P}-\text{O}$  bond is
73. What is the basicity of Pyrophosphoric acid?
74. How many  $\text{Cl}-\text{O}$  bonds in  $\text{Cl}_2\text{O}_7$
75. How many Co-ordinated water molecules is / are present in brown ring complex.