DEPARTMENT OF SCHOOL EDUCATION
Government JEE Coaching- 2019-20
UNIT TEST- 6

Time: 60 min

Marks: 180

Instructions:

1) Answer all the questions
2) For Every correct answer Four marks will be given
3) For Every wrong answer One mark will be deducted

CHOOSE THE CORRECT ANSWER **45x4=180**

1. Calculate the increase in potential energy of an object of mass m raised from the surface of the earth to a height equal to radius R of the earth

   1) mgR 2) $\frac{mgR}{4}$ 3) $\frac{mgR}{2}$ 4) 2mgR

2. A body starts from rest from a point distance R_0 from the Centre of the earth, Radius of earth is R

   1) $V=\sqrt{\frac{GM}{g}\left(\frac{1}{R}-\frac{1}{R_0}\right)}$ 2) $V=\sqrt{GM\left(\frac{1}{R}-\frac{1}{R_0}\right)}$ 3) $V=\sqrt{GM\left(R-R_0\right)}$ 4) $V=\sqrt{GM\left(R+R_0\right)}$

3. An artificial satellite is moving in a circular orbit around the earth with a speed equal to half the magnitude of escape velocity from the earth height of the satellite above the earth's surface (Given radius of earth = 6400km)

   1) 6000km 2) 6800km 3) 6400km 4) 5000km

4. A space ship is launched into a circular orbit close to the earth's surface. What addition velocity has now to be imparted to the space ship in the orbit to overcome the gravitational pull

   1) $\sqrt{gR}\ (\sqrt{3}-1)$ 2) $\sqrt{gR}\ (\sqrt{5}-1)$ 3) $\sqrt{gR}\ (\sqrt{2}-1)$ 4) $\sqrt{gR}\ (\sqrt{6}-1)$

5 If the diameter of the earth becomes two times its present value and its mass remains unchanged, then how would the weight of an object on the surface of earth be affected

   1)It becomes half 2) It becomes twice 3) It becomes one fourth 4) It becomes tripled

6. A satellite x moves round the earth in a circular orbit of radius R. Another satellite Y of same mass moves around the earth in a circular orbit of radius 4 R.The ratio of K.E of X to Y is

   1) 8 2) 2 3) 4 4) 10

7. The gravitational potential energy of the rocket of mass 100 kg at a distance of 10^7m from the earth's centre is -4×10^9 J. Weight of the rocket at a distance of 10^9 m from the earth's centre

   1) 4×10^4 N 2) 4×10^2 N 3) 4×10^{-2} N 4) 4×10^{-4} N

8. A satellite of mass M_E is in a circular orbit of radius $2R_E$ about the earth. The energy required to transfer it to a circular orbit of radius $4R_E$ is (Where M_E and R_E is the mars and radius of the earth respectively)

1) $\frac{GM_E\,m}{2R_E}$ 2) $\frac{GM_E\,m}{4R_E}$ 3) $\frac{GM_E\,m}{8R_E}$ 4) $\frac{GM_E\,m}{16R_E}$

9. Assuming the radius of the earth as 'R', the change in gravitational potential energy of a body of mass 'm' when it is taken from the earth's surface to a height '3R' above its surface is

1) 3mgR 2) $\frac{3}{4}$mgR 3) 1mgR 4) $\frac{3}{4}$mgR

10. The potential energy of a satellite, having mass 'm' and rotating at a height of ---------- from the earth surface is

1) $-\,mgR_e$ 2) $-0.67mgR_e$ 3) $-0.5\,mgR_e$ 4) $-0.33mgR_e$

11. The ratio of escape velocity at earth (v_2) to the escape velocity at a planet (v_p) whose radius and mean density are twice as that of earth is

1) 1:2 2) $1:2\sqrt{2}$ 3) 1:4 4) 1:2

12. For a satellite moving in an orbit around the earth, the ratio of kinetic energy to potential energy is

1) $\frac{1}{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) 2 4) $\sqrt{2}$

13. The mean radius of earth is 'R' its angular speed on its own axis is 'w' and the acceleration due to gravity at earth's surface is 'g'. What will be the radius of the orbit of a geostationary satellite?

1) $\left(\frac{R^2g}{w^2}\right)^{\frac{1}{3}}$ 2) $\left(\frac{Rg}{w^2}\right)^{\frac{1}{3}}$ 3) $\left(\frac{R^2w^2}{g}\right)^{\frac{1}{3}}$ 4) $\left(\frac{R^2g}{w}\right)^{\frac{1}{3}}$

14. A satellite of mass 'm' is orbiting around the earth in a circular orbit with a velocity 'v'. What will be the total energy

1) $\frac{3}{4}mv^2$ 2) $\frac{1}{2}mv^2$ 3) mv^2 4) $-\frac{1}{2}mv^2$

15. For a satellite escape velocity is 11km/s. If the satellite is launched at an angle of 60° with the vertical, then the escape velocity will be

1) 11 km/s 2) $11\sqrt{3}$ km/s 3) $\frac{11}{\sqrt{3}}$ km/s 4) 33 km/s

16. Generally the atomic ionic radii increase with in atomic number down the group. But the atomic size of aluminium and gallium is almost the same. The is because

1) The nuclear change of Ga is higher than that of Al

2) Gallium contains intervening d – electrons which do not screen the valance electron effectively

3) The ionization energies of Ga and Al are comparable

4) All of these

17. Aqeous solution of borax reacts with two mol of acids. This is because of
1)Formation of 2 mol of $B(OH)_3$ only
2)Formation of 2 mol of $[B(OH)_4]^-$ only
3)Formation of 1 mol each of $B(OH)_3$and$[B(OH)_4]^-$
4)Formation of 2 mol of each $[B(OH)_4]^-$ and $B(OH)_3$of which only $[B(OH)_4]^-$ reacts with acid

18. Alum is not used
1) as a mordant in dyeing 2) as an insecticide
3) in purification of water 4) in tanning of leather

19. Aluminothermy used for the spot welding of large iron structures is based on the fact
1)reaction between iron and oxygen is endothermic
2) as compound to Al, Fe has greater affinity for oxygen
3) as compared to iron, Al has greater affinity for oxygen
4) reaction between Al and oxygen is endothermic

20. The relative stability of the different oxidation states are given as $Tl^+ > Tl^{3+}$, $Ga^{3+} > Ga^+$ is an example of
1) redox potential 2) disproportionation 3) inert pain effect 4) electron – affinity

21. PbF_4 , $PbCl_4$ exist but $PbBr_4$and PbI_4 do not exist because of
1)large size of $Br^-$and I^- 2) strong oxidising character ofPb^{4+}
3) strong reducing character of Pb^{4+} 4) low electronegativity of $Br^-$and I^-

22. $[SiO_4]^{4-}$ has tetrahedral structure, the silicate formed by using the threeoxygenatoms has
1)two dimensional sheet structure 2) pyrosilicate structure
3) linear polymeric structure 4) 4) three dimensional structure

23. Statement I :Pb^{4+} compounds are stronger oxidizing agents than Sn^{4+} compounds
Statement 2 : The higher oxidation states for group–14 elements are mole stable for the heavier members of the group due to 'inert pain effect'
1)If both statement 1 and statement 2 are true and statement 1 is the correct explanation of statement 1
2)If the statement 1 and statement 2 are true but reason is not the correct explanation of statement 1
3) If statement 1 is true but statement 2 is false
4) If both statement 1 and statement 2are false

24. Identify x, y and z from the following reaction

i) $SiO_2 + 2NaOH \rightarrow \mathbf{X} + H_2O$

ii) $SiO_2 + 4HF \xrightarrow[Cu\ powder]{} \mathbf{Y} + 2H_2O$

iii) $Si + 2CH_3Cl \xrightarrow[5-K]{} \mathbf{Z}$

	X	Y	Z
1)	Na_2SiO_3	SiF_4	$(CH_3)_2SiCl_2$
2)	H_2SiO_3	SiF_2	CH_3SiCl_3
3)	Na_2SiO_3	H_2SiO_3	$(CH_3)_2SiCl$
4)	Na_2SiO_3	H_2SiF_4	$(CH_3)_2SiCl_2$

25. An elements of group iu forms two oxides one of which is highly poisonous and neutral other oxide can be easily liquefied and compressed to give a solid which is used as a refrigerant under the name of drikold

1) Si, SiO, SiO_2 2) Pb, PbO, PbO_2 3) C, CO, CO_2 4) Sn, SnO, SnO_2

26. Reaction of HNO_3 with I,S . P and C gives respectively

1) HIO_3, H_2SO_4, H_3PO_4 and CO_2 2) $HIO_3, H_2SO_4, H3PO_3$ and CO2

3) I_2O_5, H_2SO_4, H_3PO_4 and CO 4) I_2O_5, SO_2, P_2O and CO_2

27. Regular use of which of the following fertilizers increases the acidity of soil

1) Ammonium sulphate 2) potassium Nitrate 3) Urea 4) All of these

28. The correct order of thermal stability of hydrides of group 15 is

1) $NH_3 > PH_3 > ASH_3 < BiH_3 > SbH_3$ 2) $NH_3 > PH_3 > ASH_3 > SbH_3 > BiH_3$

3) $NH_3 < PH_3 < SbH_3 > ASH_3 > BiH_3$ 4) $BiH_3 > SbH_3 > ASH_3 > PH_3 > NH_3$

29. The reaction of P_4 with x leads selectively of P_4O_6. The x is

1) only O_2 2) a mixture of O_2 and N_2

3) Moist O_2 4) O_2 in the presence of aqueous NaOH

30. In the catalytic oxidation of ammonia an oxide is formed which is used in the preparation of HNO_3 . This oxide is ----

1) N_2O_5 2) N_2O_4 3) NO_2 4) NO

31. If $(n+1)p_5 : np_6 = 2:7$ then n = ?

1) 11 2) 10 3) 9 4) 12

32. If $12p_r = 11p_6 + 6(11p_5)$ then r = ?

1) 6 2) 5 3) 7 4) none of these

33. The number of ways in which 3 prizes can be given away to 5 boys , when each boy is eligible for

only one prize is –––––

1) $5p_3$ 2) $5c_3$ 3) 3^5 4) 5^3

34. The number of arrangements that can be made by using all the letters of the word MATRIX so that the vowels may be in the even place is –––––

1) 144 2) 2880 3) 720 4) 5760

35. A railway carriage can seat 5 each side. The number of ways a party of 4 girls and 6 boys can seat themselves so that the girls may always have the centre seat is –––––

1) 17,430 2) 17,431 3) 17,280 4) 17,281

36. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary then the word SACHIN appears at serial number

1) 601 2) 600 3) 603 4) 602

37. The sum of all 4 digits number that can be formed using the digits 2,3,4,5,6 without repetition is ––––––

1) 533820 2) 532280 3) 533280 4) 532380

38. Howmany ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order ?

1) 120 2) 480 3) 360 4) 240

39. $2nc_2 - 2 . nc_2 = ?$

1) n^2 2) $(n-1)^2$ 3) $(n+1)^2$ 4) $2n^2$

40. A candidate is required to answer 6 out of 10 questions which one divided into two groups each containing 5 questions and he is not permitted to attempt more than 4 from any group. In how many different ways to make up his choice ?

1) $5c_4 \times 5c_2 + 5c_3 \times 5c_3 + 5c_2 \times 5c_4$

2) $5c_3 \times 5c_3 + 5c_2 \times 5c_4 + 5c_3 \times 5c_2$

3) $5c_3 \times 5c_2 + 5c_4 \times 5c_2 + 5c_1 \times 5c_3$

4) $5c_2 \times 5c_3 + 5c_3 \times 5c_2 + 5c_4 \times 5c_5$

41. The total number of ways of selecting five letters from the letters of the word INDEPENDENT is –––––

1) 12 2) 24 3) 48 4) 72

42. Let T_n denotes the number of triangles which can be formed by using the vertices of a regular polygon of n sides. If $T_{n+1} - T_n = 21$ then $n = ?$

1) 5 2) 7 3) 6 4) 4

43. The greatest number of points of inter section of 8 lines and 4 circles is ------

1) 64 2) 92 3) 104 4) none

44. At an election , three wards of a town are canvassed by 3 , 4 and 5 men respectively . If 20 men volunteer, in how many ways can they be allotted to the different wards ?

1) $30C_3$ 2) $17C_4$ 3) $13C_5$ 4) $20C_3 . 12C_4 . 13C_5$

45. The number of ways in which 1800 can be divided into two factors is -----

1) 17 2) 18 3) 36 4) 34

ANSWER KEY

1	3	16	1	31	1
2	2	17	4	32	1
3	3	18	4	33	1
4	3	19	1	34	1
5	3	20	4	35	3
6	3	21	2	36	1
7	3	22	1	37	3
8	3	23	1	38	3
9	2	24	1	39	1
10	3	25	3	40	1
11	2	26	1	41	4
12	1	27	1	42	2
13	1	28	2	43	3
14	4	29	2	44	4
15	1	30	4	45	2