DEPARTMENT OF SCHOOL EDUCATION
Government JEE Coaching- 2019-20
UNIT TEST- 5

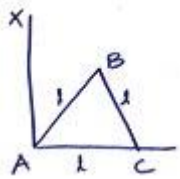
Time: 60 min

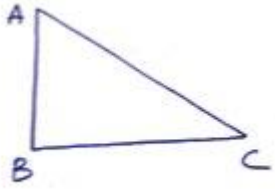
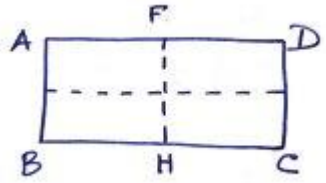
Marks: 180

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.	Moment of Inertia of a uniform circular disc about a diameter is 'I'. Its moment of inertia about an axis perpendicular to its plane and passing through a point on its rim will be			
	1) $5I$	2) $3I$	3) $6I$	4) $4I$
2.	A thin rod of length 'L' and mass 'M' is bent at its mid-point into two halves so that the angle between them is 90°. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane divided by the two halves of the rod is			
	1) $\frac{ML^2}{24}$	2) $\frac{ML^2}{12}$	3) $\frac{ML^2}{6}$	4) $\frac{\sqrt{2}ML^2}{24}$
3.	Four identical thin rods each of mass 'M' and length 'l' form a square frame. Moment of inertia of this frame about an axis through the centre of the square and perpendicular to its plane is			
	1) $\frac{2}{3}MI^2$	2) $\frac{13}{3}MI^2$	3) $\frac{1}{3}MI^2$	4) $\frac{4}{3}MI^2$
4.	Three identical spherical shells, each of mass 'M' and radius 'r' are placed as shown in the figure. Consider an axis XX' which is touching to two shells and passing through the diameter of the third shell. Moment of Inertia of the system consisting of these three spherical sphells xx' axis is 			
	1) $3mr^2$	2) $\frac{16}{5}mr^2$	3) $4mr^2$	4) $\frac{11}{5}mr^2$
5.	Three particles, each of mass 'm' gram, are at the vertices of an equilateral triangle ABC side 'l' cm. The moment of inertia of the system about a line 'AX' Perpendicular to 'AB' and in the plane of ABC, in gm-cm^2 units will be 			
	1) $\frac{3}{2}ml^2$	2) $\frac{3}{4}ml^2$	3) $2ml^2$	4) $\frac{5}{4}ml^2$

6.	There is a flat uniform triangular plate ABC such that AB=4cm, BC=3cm and angle ABC=90°. The moment of inertia of the plate about AB, BC and CA as axis is respectively I, I_2 and I_3. Which one of the following is true ?  			
	1) $I_3 > I_2$	2) $I_2 > I_1$	3) $I_3 > I_1$	4) $I_1 > I_2$
7.	In a rectangle ABCD (BC=2AB). The moment of inertia is minimum along the axis through  			
	1) BC	2) BD	3) HF	4) EG
8.	The period of revolution of planet 'A' around the Sun is 8 times that of 'B'. The distance of 'A' from the Sun is how many times greater than that of 'B' from the Sun			
	1) 2	2) 3	3) 4	4) 5
9.	The distance of Neptune and Saturn from the Sun is nearly 10^{13} and 10^{12} meter respectively. Assuming that they move in circular orbits, their periodic times will be in the ratio			
	1) 10	2) 100	3) $10\sqrt{10}$	4) 1000
10.	A Satellite 'A' of mass 'm' is at a distance of 'r' from the surface of the earth. Another satellite 'B' of mass '2m' is at a distance '2r' from the earth's centre. Their time periods are in the ratio of			
	1) 1:2	2) 1:16	3) 1:32	4) $1:2\sqrt{2}$
11.	The longest and shortest distance of earth from the Sun are 'r_1' and 'r_2'. Its distance from the Sun when it is at perpendicular to the major-axis of the orbit drawn from the Sun is			
	1) $\frac{r_1+r_2}{4}$	2) $\frac{r_1+r_2}{r_1-r_2}$	3) $\frac{2r_1r_2}{r_1+r_2}$	4) $\frac{r_1+r_2}{3}$
12.	Two spheres of masses 'm' and 'M' are situated in air and the gravitational force between is 'F'. The space around the masses is now filled with a liquid specific gravity '3'. The gravitational forde will now be			
	1) $\frac{F}{9}$	2) 3F	3) F	4) $\frac{F}{3}$
13.	Two spherical bodies of mass 'M' and '5M' and radii 'R' and '2R' released in free space with the initial separation between their centres equal to '12R'. If they attract each other due to gravitational force only, then the distance covered by a smaller body before collision is			
	1) 4.5R	2) 7.5R	3) 1.5R	4) 2.5R

14.	Imagine a new planet having the same density as that of earth but it is 3 times bigger than the earth in size. If the acceleration due to gravity on the surface of the earth is 'g' and that on the surface of the new planet is 'g'. Then			
	1) $g^1 = \frac{g}{9}$	2) $g^1 = 27\,g$	3) $g^1 = 9g$	4) $g^1 = 3g$
15.	The acceleration due to gravity on the planet 'A' is 9 times the acceleration due to gravity on planet 'B'. A man jumps to height of 2m on the surface of 'A'. What is the height of 2m on the surface of 'A'. What is the height of the jump by the same person on the planet 'B' ?			
	1) $\frac{2}{3}m$	2) $\frac{2}{9}m$	3) $18m$	4) $6m$
16.	The production of dihydrogen gas via water – gas shift reaction is as follows $CO(g) + H_2O(g) \xrightarrow[catalyst]{\Delta} CO_2(g) + H_2(g)$ The CO_2 gas is removed by scrubbing with solution of			
	1)Sodium arsenite	2) Calcium oxide	3) Sodium phosphite	4) Aluminium oxide
17.	Non – stoichiometric hydrides are formed by			
	1)Palladium & vanadium		2) Manganese & lithium	
	3) Nitrogen & fluorine		4) Carbon & nickel	
18.	Which is the poorest reducing agent ?			
	1)nascent hydrogen		2) Atomic hydrogen	
	3) Dihydrogen		4) None of these	
19.	In the lab, H_2O_2 is prepared by the action of			
	1)Cool dilute H_2SO_4 on hydrated BaO_2		2) dil HCl on MnO_2	
	3) Cold H_2SO_4 on MnO_2		4) aqueous alkali on Na_2O_2	
20.	What would happen when small quantity of H_2O_2 is added to $FeSO_4$ solution			
	1) O_2 is evolved	2) H_2 is evolved	3) an electron is added to Fe^{2+}	4) an electron is lost by Fe^{2+}
21.	Strength of 10 volume solution of H_2O_2			
	1) 10 %	2) 3 %	3) 5 %	4) 6 %
22.	How many hydrogen bonded water molecules are associated in $CuSO_4.5H_2O$			
	1) 5	2) 1	3) 4	4) 3
23.	Formula of baking soda is			
	1) $NaHCO_3$	2) $NaNO_2$	3) $BaCl_2$	4) Na_2CO_3
24.	Which of the following is false for alkali metals			
	1)Lithium is the strongest reducing agent		2) Na forms superoxide with oxygen	
	3) Li^+ is exceptionally small		4) Alkali metals have high reactivity in waater	
25.	Which one of the alkali metals forms only the normal oxide M_2O on heating in air ?			
	1) Rb	2) K	3) Li	4) Na

26.	Epsom salt is			
	1) $CaSO_4.2H_2O$	2) $BaSO_4.2H_2O$	3) $MgSO_4.2H_2O$	4) $MgSO_4.7H_2O$
27.	Which of the following is strongest base ?			
	1) $Ca(OH)_2$	2) $Ba(OH)_2$	3) $Mg(OH)_2$	4) $Be(OH)_2$
28.	Which of the following arrangements is correct with respect to solubility in water			
	1) Ba <Mg <Ca <Sr	2) Mg <Ca <Sr <Ba	3) Ba <Mg <Sr<Ca	4) Ba <Sr<Ca <Mg
29.	Which one of the following alkali metal chlorides is expected to have highest melting point			
	1) LiCl	2) NaCl	3) KCl	4) RbCl
30.	Which of the following properties is not true for an alkali metal			
	1) low atomic volume		2) low ionisation enthalpy	
	3) low density		4) low electronegativity	
31.	Sum to infinity of the series $1+\frac{4}{5}+\frac{7}{5^2}+\frac{10}{5^3}+-------$			
	1) $\frac{5}{4}$	2) $\frac{35}{16}$	3) $\frac{15}{16}$	4) 0
32.	Sum to infinity of the series $1-3x+5x^2-7x^3+-------$ when $\|x\|<1$			
	1) $\frac{1-x}{(1+x)^2}$	2) $\frac{1-x}{1+x}$	3) $\frac{1}{(1+x)^2}$	4) $\frac{1+x}{1-x}$
33.	The sum to 50 terms of the series $1+2(1+1/50)+3(1+1/50)^2+$ ----- is			
	1) 2500	2) 2550	3) 2450	4) None
34.	$1+\log_e x+\frac{(\log_e x)2}{2!}+\frac{(\log_e x)3}{3!}+------$			
	1) 1	2) e	3) x	4) e^x
35.	$\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\frac{1}{5!}+--------$			
	1) e	2) e/2	3) e^{-1}	4) e−2
36.	$\sum_{n=1}^{\infty}\frac{2n}{(2n+1)!}---$			
	1) $\frac{1}{e}$	2) $\frac{e}{2}$	3) e	4) 2e
37.	The sum of the series $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+------$ is			
	1) $\frac{e^2-1}{2}$	2) $\frac{e^2-2}{e}$	3) $\frac{e^2-1}{2e}$	4) $\frac{(e-1)^2}{2e}$
38.	$\frac{1}{2!}+\frac{1+2}{3!}+\frac{1+2+3}{4!}+-------$			
	1) e	2) 2e	3) e/2	4) 1/e

39.	$\frac{1}{1.3}+\frac{1}{2.5}+\frac{1}{3.7}+------=$			
	1) $1-\log_e 2$	2) $1+\log_e 2$	3) $2-\log_e 2$	4) $1-2\log_e 2$
40.	If P:7>4, q: 7<9, then pvq			
	1)True	2) False	3) Cannot be determined	4) None
41.	The negation of ~sV (~$r\wedge$s) is equivalent to			
	1) S$\wedge$~r	2) S$\wedge$($r\wedge$~s)	3) SV(rV~s)	4) S$\wedge r$
42.	The contrapositive of p $\Rightarrow q$ is			
	1) p $\Rightarrow q$	2) q$\Rightarrow p$	3) ~p $\Rightarrow$ ~q	4) ~q $\Rightarrow$ ~p
43.	P: she is beautiful, q: she is intelligent. The symbolic form of "if she is not beautiful then she is not intelligent " is			
	1) p $\Rightarrow$ ~q	2) ~p $\Rightarrow q$	3) ~p $\Rightarrow$ ~q	4) ~q$\Rightarrow$ ~p
44.	[$p\wedge(\sim q)]\wedge[\sim pV(q)]$ is			
	1) a tautology 3) a tautology and a contradiction		2) a contradiction 4) neither tautologynor a contradiction	
45.	The statement is~$(p \leftrightarrow \sim q)$is			
	1)a tautology	2) a fallacy	3) equivalent to p$\leftrightarrow q$	4) equivalent to ~p$\leftrightarrow q$

ANSWER KEY

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