Astronomy

Single Correct Questions +3 | -1

1. The wave length of H_a line from hydrogen discharge tube in a laboratory is 656 nm. The corresponding radiation received from two galaxies A and B have wavelengths of 648 nm and 688 nm respectively.Then

   (A) A is approaching the earth with a speed of $2.4 \times 10^4\ kms^{-1}$

   (B) B is approching the earth with a speed of $1 \times 10^4\ kms^{-1}$

   (C) A is receding from the earrth with a speed of $3.6 \times 10^4\ kms^{-1}$

   (D) B is receding the earth with a speed of $1.5 \times 10^4\ kms^{-1}$

2. The correct sequence of the objects in the ascending order of distance from the sun, is

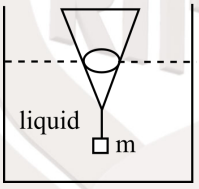
   (A) Kupier belt , Uranus ,asteroid belt and oort cloud

   (B) uranus ,asteroid belt ,oort cloud and kupier belt

   (C) Oort cloud,asteroid belt, Uranus and Kupier belt

   (D) asteroid belt, Uransus, kupier belt, and Oort cloud

3. A cone of height h is floating in a liquid upside down with a mass m attached to it as shown in the figure.Water reaches a height of h/2 at equilibrium. The cone is now given a small downward push and is found to oscillate about its mean position. If friction is ignored the frequency of this oscillation is



   (A) $\frac{1}{2\pi}\sqrt{\frac{g}{h}}$ (B) $\frac{1}{2\pi}\sqrt{\frac{2g}{h}}$ (C) $\frac{1}{2\pi}\sqrt{\frac{6g}{h}}$ (D) $\frac{1}{2\pi}\sqrt{\frac{9g}{h}}$

4. The number of solutions of $1 - \sin^4 x - 2\cos^4 x = 0$ in the interval $[0, 2\pi]$ is

   (A) 6 (B) 4 (C) 2 (D) 0

5. A solid sphere is rotating freely about its symmetry axis in free space.The radius of the sphere is increased keeping its mass same.Which of the following physical quantities would remain constant for the sphere ?

   (A) Angular momentum (B) Rotational kinetic energy

   (C) Moment of inertia (D) Angular velocity

6. If n is the least positive integer such that $\binom{n-1}{5} + \binom{n-1}{7} < \binom{n}{7}$,the sum of digits of n is

   (A) 6 (B) 5 (C) 4 (D) 3

Space for rough use

7. The flat surface of a solid hemisphere of radius r is cemented to one flat surface of a cylinder (of identical material) of radius r and length L if the total mass is M, moment of inertia of the combination about the axis of the cylinder will be

(A) $Mr^2\frac{\frac{L}{2}+\frac{4r}{15}}{L+\frac{2r}{3}}$ (B) $Mr^2\frac{\frac{L}{3}+\frac{4r}{5}}{L+\frac{2r}{3}}$ (C) $Mr^2\frac{\frac{L}{3}+\frac{3r}{5}}{\frac{L}{2}+\frac{r}{3}}$ (D) $Mr^2\frac{\frac{L}{6}+\frac{2r}{5}}{L+\frac{4r}{3}}$

8. The limit $\lim_{x\to\infty}\sqrt{x+\sqrt{x+\sqrt{x}}}-\sqrt{x}$

(A) does not exist (B) is $\frac{1}{2}$ (C) is 2 (D) is in 2

9. An electron is moving with uniform velocity along a line in the plane of the paper. It is now subjected to a uniform magnetic field B perpendicular to the plane of the paper and going into it.The electron will move in a circular path in the plane of the paper in

(A) Clockwise direction with time period proportional to B

(B) anticlockwise direction with time period inversely proportional to B.

(C) clockwise direction with time period inversely proportional to B.

(D) anticlocksise direction with time period proportional to B.

10. Let $s_n=1+2\left(1+\frac{1}{n}\right)+3\left(1+\frac{1}{n}\right)^2+.....+n\left(1+\frac{1}{n}\right)^n$ .Then $\sum_{n=1}^{\infty}\frac{1}{2^{\,2\sqrt{s_n}}}$ is equal to

(A) $\frac{4}{3}$ (B) $\frac{1}{3}$ (C) 3 (D) 1

11. A loudspeaker emits sound at a maximum audible level of 130 dB when measured directly from a distance of 1 metre. If the safe limit of audible sound to our ears is 90 dB, a listener must stand directly at a minimum distance of

(A) 1.44 m (B) $e^2\ m$ (C) 100 m (D) 2.09 m

12. The diameter of radio telescope, working at a wavelength of $\lambda=1\ \text{cm}$, with the same resolution as optical telescope of diameter D= 10 cm is

(A) 2m (B) 2 km (C) 20 km (D) 200 km

13. In a binary system, the apparent magnitude of the primary star is 1.0 and that of the secondary star is 2.0 .The maximum combined magnitude of this system is

(A) 3 (B) 1.5 (C) 1 (D) 064

14. Suppose the tangent of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(b<a)$ at the point $\left(ae,-\frac{b^2}{a}\right)$ makes an angle of 30^o with x-axis.Then $\frac{b^2}{a^2}$ equals

(A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$

Space for rough use

15. A piece of strong magnet is suspended from a helical spring made of a non magnetic material and oscillates in a vertical plane with a time period of T on the surface of the earth. If this is taken to the moon then it will oscillate

(A) with a time period $T_1 > T$ as the value of $'g'$ is smaller on the moon

(B) with a time period $T_1 < T$ as the value of $'g'$ is smaller on the moon

(C) with a time period $T_1 < T$ as there is no magnetic field on the moon.

(D) with the same time period as the spring and the suspended body are the same on the moon.

16. The number of triples (a, b, c) of natural numbers satisfying the equation $\frac{5}{12} = \frac{1}{a} + \frac{1}{ab} + \frac{1}{abc}$ is

(A) 7 (B) 8 (C) 9 (D) 12

17. A 1.5 times magnified real image of an object is obtained when it is placed $16cm$ away from a thin convex lens. Now a thin concave lens is placed in contact with the convex lens keeping the object undisturbed and an image of same mangification is formed by the combination. The focal lenght of the concave lens is:

(A) $8\ cm$ (B) $10\ cm$ (C) $12\ cm$ (D) $16\ cm$

18. Let ABC be an equilateral triangle with side x. Two points P and Q are inside ABC such that PQ is parallel to BC and $AP = AQ = PB = QC = \sqrt{3} + 1$ and $PQ = \sqrt{2}$. Then x equals

(A) $4\sqrt{2} + 2\sqrt{6}$ (B) $2\sqrt{2} + \sqrt{6}$

(C) $2\sqrt{3} + \sqrt{6}$ (D) $2\sqrt{6} + \sqrt{3}$

19. Critical velocity, drift velocity, escape velocity, and rms velocity are the different types of velocities that we come across in the same order while discussing

(A) viscosity, electron motion in solids, gravitation, surface tension respectively

(B) motion of gas molecules, viscosity, gravitation, electron motion in solids respectively

(C) sound propagation, gratitation, motion of gas molecules, colour of light respectively

(D) viscosity, electron motion in solids, gravitation, motion of gas molecules respectively

20. In a triangle ABC, AB is extended to D such that $AB : BD = 4 : 1$; BC is extented to E such that $BC : CE = 4 : 1$; and CA is extended to F such that $CA : AF = 4 : 1$. The ratio of the area of triangle DEF to that of ABC is:

(A) $\frac{5}{2}$ (B) $\frac{7}{2}$ (C) $\frac{15}{8}$ (D) $\frac{31}{16}$

21. Sun is at a mean distance of about $27,000$ light years from the centre of the Milky way galaxy and completes one revolution about the galactic centre in about 225 million years. The linear speed of Sun is:

(A) $160\ km\ s^{-1}$ (B) $230\ km\ s^{-1}$ (C) $30\ km\ s^{-1}$ (D) $80\ km\ s^{-1}$

22. Light from the nearest star 'promixa centauri' takes 4.24 light years to reach earth. The stellar parallax of this star is about

(A) $1.30\ s$ (B) $0.77\ s$ (C) $13.8\ s$ (D) $0.24\ s$

Space for rough use

23. A block of conductor with its area equal to 'A' and thickness 'b' is placed between the plates of a parallel plate capacitor without touching either of the plates. If the area of the plates of the capacitor be 'A' each and 'd' be the separation between the plates then the capacitance of the system after the introduction of the block is :

(A) $\frac{\epsilon_0 A}{d}$ (B) $\frac{\epsilon_0 A}{d\left(1+\frac{b}{d}\right)}$ (C) $\frac{\epsilon_0 A}{d\left(1-\frac{b}{d}\right)}$ (D) $\frac{\epsilon_0 A}{d\left[\left(1+\frac{b}{d}\right)^2\right]}$

24. The number of real solutions of the equation $|x-|x-|x-4|||=x^2-4x$ is

(A) 0 (B) 1 (C) 2 (D) more than 2

25. A body of mass $1.0kg$ is pulled along a rough horizontal surface by a horizontal force of $5N$ for $10\ s$ starting from rest. If the kinetic friction is $\mu_k = 0.40$, the amount of heat generated is equal to (assuming $g = 10\ \mathrm{ms}^{-2}$)

(A) $190\ J$ (B) $200\ J$ (C) $210\ J$ (D) $205\ J$

26. Six dice are rolled simultaneously. The probability of getting at least four identical numbers is

(A) $\frac{2250}{6^6}$ (B) $\frac{2436}{6^6}$ (C) $\frac{2535}{6^6}$ (D) $\frac{2738}{6^6}$

27. The ceiling of a long hall is 45 m high. The maximum horizontal distnace that a ball thrown with a speed of $50\ m\ s^{-1}$ can go without hitting the ceiling is nearly equal to $(g = 10\ m\ s^{-2})$

(A) 250 m (B) 240 m (C) 230 m (D) 300 m

28. The tangents drawn from a certain point P to the parabola $2y = x^2 - 2$ are also tangents to the parabola $4y = x^2 - 10x + 37$. The sum of the coordinates of P is

(A) 10 (B) 6 (C) 0 (D) -10

29. A yo-yo of mass 'M' and radius of the inner hub 'r' is completely wound with a string. It is allowed to start unwinding with zero downward initial velocity. The momnet of inertia of the yo-yo about an axis passing through its centre of mass and normal to the discs is I. The acceleration with which the yo-yo falls when $I = Mr^2$ can be given by

(A) a = g (B) a = g/2 (C) a = 2g/3 (D) a = g/4

30. What is the least possible length of a line segment that cuts a triangle with sides 3, 4, 5 in to two geometrical figures having equal area?

(A) $\sqrt{12}$ (B) $\sqrt{6}$ (C) $\sqrt{5}$ (D) 2

31. A plane spiral of N turns, having the radii of internal and external loops as r_1 and r_2 carries a current I. The magnetic induction at the centre of the spiral will be

(A) $\frac{\mu_0 NI}{(r_2-r_1)} ln\frac{r_2}{r_1}$ (B) $\frac{\mu_0 NI}{2(r_2-r_1)} ln\frac{r_2}{r_1}$ (C) $\frac{\mu_0 NI}{(r_2-r_1)} ln\frac{r_1}{r_2}$ (D) $\frac{\mu_0 NI}{2(r_2-r_1)} ln\frac{r_1}{r_2}$

Space for rough use

32. The number of nonzero real solutions of the equations $x^{x+y} = y^3,\ y^{x+y} = x^{12}$ is

(A) 0 (B) 1 (C) 2 (D) more than 2

33. Two identical circular coils are carrying current $i_1 \text{ and } i_2$ are suspended from a torsion free cotton thread is placed in a region of uniform magnetic field B. Each time the coils are given a small angular displacement from their respective equilibrium positions. The time period of the small torsional oscillations were found to be $T_1 \text{ and } T_2$. The ratio $\frac{T_1}{T_2}$ would be

(A) $\frac{i_1}{i_2}$ (B) $\frac{i_2}{i_1}$ (C) $\sqrt{\frac{i_1}{i_2}}$ (D) $\sqrt{\frac{i_2}{i_1}}$

34. A triangle a side of length 8 units, one of the angles of the triangle on this side is 60^o. If the inradius of the triangle is $\sqrt{3}$ units, the perimeter of the triangle is

(A) $15\sqrt{3}$ (B) 24 (C) $12\sqrt{3}$ (D) 20

35. Two cells with emfs $E_1 \text{ and } E_2$ have internal resistance $r_1 \text{ and } r_2$ respectively. The two cells are connected in series with an external resistance and the current through the external resistance is found to be 1.5 A. When the polarities of the cells are reversed this current is found to be 0.5 A. The ratio of the emfs of the cells is

(A) 2.5 (B) 1.5 (C) 2 (D) 4

36. A points $P(8,4)$ divides a chord, lying completely in the first quadrant, of a parabola $y^2 = 4x$ in the ratio 1 : 4. The mid-point of the chord has coordinates

(A) $(17.5, 8)$ (B) $(18.5, 7)$ (C) $(19.5, 6)$ (D) $(20.5, 6)$

37. The de Broglie wavelength associated with neutrons with thermal equalibrium with matter at temperatures 300 K and at 400 K are in the ratio close to

(A) 1 : 1 (B) 1.15 : 1 (C) 1 : 2.3 (D) 1 : 2.8

38. The sum of all real values of α for which the equation $x^3 - 7x + \alpha = 0$ has two real roots different by 1 is

(A) 0 (B) 6 (C) 12 (D) -12

39. Which of the following physical quantities has the unit volt-second

(A) Energy (B) Electric flux (C) Magnetic flux (D) Inductance

40. A die is rolled 5 times. The probability that there are atleat two equal numbers among the outcomes obtained is

(A) $\frac{319}{324}$ (B) $\frac{49}{54}$ (C) $\frac{13}{18}$ (D) $\frac{4}{9}$

41. Imagine a planet of same mass as that of the earth but having a radius twice of that of the earth. A simple pendulum located at some point on its equator failed to show any oscillation where given a small displacement from its equilibrium position. The time taken by this planet to spin once about its own axis is

(A) nearly 2 hours (B) nearly 4 hours (C) nearly 6 hours (D) nearly 8 hours

Space for rough use

42. Let ABCD be a rectangle. Let E be a point on the diagonal AC at a distance 16 from the side AB and let DE = 15. Then the area of the rectangle ABCD to the nearest integer is

(A) 468 (B) 469 (C) 470 (D) 471

43. An alloy of two metals is formed by taking their equal masses and it was found to float of mercury $(\text{density } 13.6g\ cm^{-3})$ with 52.7% above the mercury surface. When an alloy is formed by taking equal volumes of these two metals it was found to float on mercury with 51.5% of its volume below the surface of mercuty. The densities of the two metals in $g\ cm^{-3}$ are closest to

(A) 6 and 8 (B) 5 and 9 (C) 4.5 and 9.5 (D) 4 and 10

44. If n is the number of functions $f : \{a, b, c, d\} \to \{a, b, c, d\}$ such that no more two elements in the domain of f have the same image, then

(A) $n \leq 100$ (B) $100 < n \leq 150$ (C) $150 < n \leq 200$ (D) $n > 200$

45. On the rechargeable batteries of 1.5 V often used for digitial cameras one can find 2300 mAh of 2800 mAh or something similar is written. This is connected to the

(A) power that the battery can provide (B) current that can be drawn from the battery

(C) total charge that the battery can supply (D) time for which the battery can be used

46. The planet in which sun appears to rise in the west is

(A) Venus (B) Uranus (C) Saturn (D) Mercury

47. Apart from the earth, Aurora phenomena are observed on which of the following planet(s)

(A) Venus (B) Mars (C) Mercury (D) Jupiter

48. The sum of the last three digits in the expansion of 5^{2018} is

(A) 8 (B) 9 (C) 13 (D) 14

49. if the wavelength of the incident light changes from 400 nm to 300 nm the stopping potential for photoelectrons emitted from the surface of a material becomes

(A) 0.56 V lower (B) 1.04 V higher (C) 0.34 V lower (D) 0.56 V higher

50. Find the interger closest to the integral $\int_0^6 x^{[\sqrt{x}]}dx$, where $[x]$ denotes the largest integer not exceeding x

(A) 58 (B) 59 (C) 60 (D) 61

51. A ray of light enters a glass prism of refractive index 1.55. The cross-section of the prism is an equilateral triangle. The emergent ray comes out of the other refracting surface at the grazing angle. The angle of incidence on the first surface is about

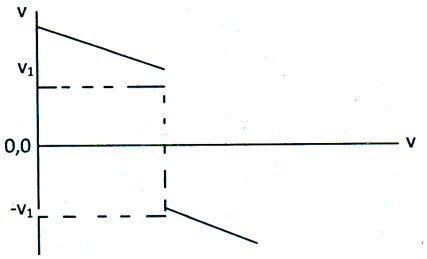
(A) 30.7^o (B) 28.2^o (C) 37.6^o (D) 41.2^o

Space for rough use

52. Let $\frac{X^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ be an ellipse with major axis AA' and minor axis BB'. Let F and F' be the foci of the ellipse, with F between A and F'. Suppose ABF' forms a right-angled triangle. Let e denote the eccentricity of the ellipse. If ϕ denotes $\angle FAB,\ \text{then}\ \tan^2(\phi)$ is equal to

(A) $\sqrt{e}$ (B) e (C) e^2 (D) $1+e$

53. The following graph shows a velocity versus time graph for a ball. Which explanation best fits the motion of the ball as shown by the graph?



(A) The ball falls from a height, is caught, and is thrown down with a greater velocity.

(B) The ball rises to a height, hits the ceiling, and falls down.

(C) The ball falls from a height, hits the floor, and bounces up.

(D) The ball rises to a height, is caught, and then is thrown down with the same velocity.

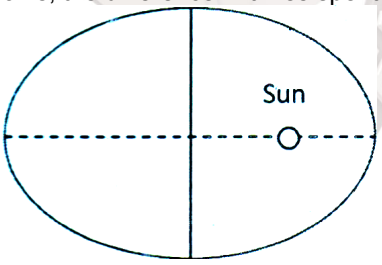
Comprehension Based Questions

Please Answer Questions 54-57 based on the text provided below

Marking Scheme - +3 | -1.00

For answering the questions 54 to 57 read the next few lines. Out konwledge of planetary systems is based on the wealth of observations by Copernicus, Tycho Brahe, Johannes Kepler spread over more than a century. Newtons may have got some clues about his famous law of universal gravitation, at least the inverse square nature of distance law, from the painstaking work of his predecessors.

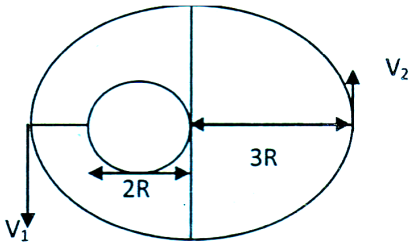
54. According to Kepler's first law, planets go round the Sun in elliptic orbits. If orbit of the earth of eccentricity e around Sun is divided into two halves by the minor axis, the difference in times spent in the two halves of the orbit is



(A) $2e/\pi$ year (B) e/π year (C) $e/(1-e)$year (D) $2e^2/(1-e^2)$ year

Space for rough use

55. A planet goes around a star of mass M and radius R in an orbit of semi major axis $3R$, with the distances as shown. What is the velocity V_1 at the point closest to the star:



(A) $(GM/2R)^{1/2}$ (B) $(2GM/3R)^{1/2}$ (C) $(4GM/3R)^{1/2}$ (D) $(GM/6R)^{1/2}$

56. What are the eccentricity and length of semi minor axis in the orbit in Q.55?

(A) 0.30, 2.50R (B) 0.33, 2.00R (C) 0.33, 2.83R (D) 0.25, 2.75R

57. If the earth of mass M is assumed to be a sphere of 6400 Km, with what velocity must a projectile be fired from the earth's surface in order that its subsequent path may be an ellipse with major axis 80,000 Km? [Take the product $GM = 4.0 \times 10^{14} m^3 s^2$]

(A) 10.70 Km/s (B) 11.20 Km/s (C) 9.50 Km/s (D) 11.70 Km/s

58. Consider the cubic curve $y = 2x^3 - 12x^2 + 18x + 5$. Let A and C be its extremum points. The tangents at A and C to the curve intersect it again at two other point B and D respectively. The area of the quadrilateral $ABCD$ is

(A) 12 (B) 24 (C) 36 (D) 48

59. A crater on the surface of the moon has a diameter of 80 km. If the distance to earth and moon is $3.78 \times 10^5\ km$ then the visual angle in degree is

(A) 0.012 (B) 0.021 (C) 0.019 (D) 0.026

60. *A K-type star in the main sequence has a luminosity of 0.40 times the luminosity of sun. This star is observed to have a flux of $6.23 \times 10^{-4} W m^{-2}$. The distance (in parsec) to this star is about (ignore atmospheric effects, luminosity of sun is $3.8 \times 10^{26} W$ and 1 parsec is $3.08 \times 10^{16} m$)

(A) 45 pc (B) 4.5 pc (C) 450 pc (D) 0.45 pc

61. There is a uniformly charged non-conducting solid sphere made of material of dielectric constant 1. If the electric potential at infinity is taken to be zero, then the potential at its surface is V. If we take the electric potential at its surface to be zero, then the potential at the centre will be

(A) $3V/2$ (B) $V/2$ (C) V (D) Zero

62. Suppose $5\cos x + 12\cos y = 13$. The maximum possible value of $5\sin x + 12\sin y$ is

(A) $\sqrt{13}$ (B) $\sqrt{120}$ (C) $\sqrt{240}$ (D) 13

63. If speed of light (C), acceleration due to gravity (g) and pressure (P) ara taken to be fundamental units, then dimension of unviersal gravitational constant (G) is

(A) CgP^{-3} (B) $C^2g^3P^{-2}$ (C) $C^0g^2P^{-1}$ (D) $C^2g^2P^{-2}$

Space for rough use

64. Let $f(x) = \begin{cases} \frac{\pi}{2}\sin x, & \text{for } 0 < x \leq \frac{\pi}{2} \\ \frac{\pi}{2}, & \text{for } \frac{\pi}{2} \leq x < \pi \end{cases}$. Then

(A) no where continuous $(0, \pi)$

(B) continuous on $(0, \pi)$ except at $x = \frac{\pi}{2}$

(C) continuous on $(0, \pi)$, but nowhere differentiable

(D) differentiable at all points of $(0, \pi)$

65. A wave propagating along X-axis is represented by $y = a\sin(At - Bx + c)$ where y is the displacement of the particle, a the amplitude of the wave and t is the time. If A, B, C are three constants then the dimension of $\left(\frac{aBC}{A}\right)$ is the same as that of

(A) Length (B) Mass (C) Time (D) Velocity

66. The sides of a triangle are $8, 10, x$ where x is positive integer. The number of possible values of x for which triangle becomes acute is

(A) 6 (B) 5 (C) 4 (D) 3

67. The speed $(v \text{ in } m/s)$ and time $(t \text{ in second})$ for an object moving along a straight line are related as $t^2 - 2\sqrt{2}vt + 50 = 0$. The possible values of v is

(A) $v \geq 5\ m/s$ only (B) $v \geq 10\ m/s$ only (C) $v \geq 15\ m/s$ only (D) $v \geq 25\ m/s$ only

68. There are n teachers in a school and all possible 4 member committees are formed. Among these, exactly $\frac{1}{20}$th part of the committees have 2 fixed members. The sum of the length of n is

(A) 8 (B) 7 (C) 6 (D) 5

69. A chamber is enclosed in a thermally insulated cover and a partition wall separates it into two parts A and B. Part A is filled up with an ideal gas at pressure p_A and as a volume V_A. The other part (part B) is evacuated and has a volume V_B. Assume this part to be vaccum. The partition wall is now removed. When the equilibrium is set in. The pressure p in the entire chamber is

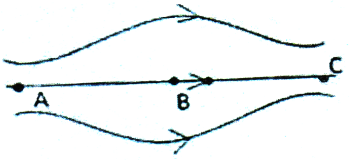
(A) $p = p_A$ (B) $p = \frac{p_A(V_A + V_B)}{V_B}$ (C) $p = \frac{p_A V_A}{V_A + V_B}$ (D) $p = \frac{p_A V_B}{V_A + V_B}$

70. Let $(1 + x - 3x^2)^{2018} = a_0 + a_1 x + a_2 x^2 + ... + a_{4036}x^{4036}$. The last digit of $a_0 + a_2 + a_4 + ...a_{4036}$ is

(A) 0 (B) 5 (C) 7 (D) 9

Space for rough use

71. The figure shows some of the field lines of an electric field. The figure suggests that



(A) $E_A > E_B > E_C$ (B) $E_A = E_B = E_C$ (C) $E_A = E_C > E_B$ (D) $E_A = E_C < E_B$

72. The value of the integral $\int_0^2 x\cos(\pi\{\pi\})dx, \text{where } \{x\}$ denotes the fractional part of x is

(A) 0 (B) $\frac{4}{\pi^2}$ (C) $\frac{-4}{\pi^2}$ (D) $\frac{-2}{\pi^2}$

73. The moment of the force $F = 4i + 5j - 6k$ acting at the point $(2, 0, -3)$ and about the axis passing through a point $(2, -2, -2)$ is given by

(A) $-7i - 4j - 8k$ (B) $-7i - 8j - 4k$ (C) $-4i - j - 8k$ (D) $-8i - 4j - 7k$

74. If $\alpha\ \beta\ \gamma$ are the roots of $\begin{vmatrix} x & 1 & 2 \\ 1 & x & 2 \\ 1 & 2 & x \end{vmatrix} = 0,\ \text{then},\ \frac{\alpha^4 + \beta^4 + \gamma^4}{\alpha^2 + \beta^2 + \gamma^2}$ equals

(A) $\frac{1}{7}$ (B) 7 (C) $\frac{1}{6}$ (D) 6

75. If all nuclear reactions in the sun now were to suddenly stop for ever, then

(A) Distances between planets and sun would decrease.

(B) Angular momemtum of planets would increase.

(C) Inner planets will be engulfed by the sun.

(D) Speed of rotation of the sun about its own axis would increase.

76. Three well known starts (a) Procyon (b) Antares and (c) Vega are respectively in the constellation

(A) Orion, Sagittarius and Scorpios (B) Orion, Taurus and Ursa major

(C) Canis minor, Scorpius and Lyra (D) Scorpions, Canes minor and Leo

77. One gram of Radium, with atomic weight 226, emits 4×10^{10} particles per second. The half-life of Radium is

(A) $4.6 \times 10^{10}s$ (B) $4.6 \times 10^{9}s$ (C) $4.6 \times 10^{12}s$ (D) $4.6 \times 10^{14}s$

Space for rough use

78. Let $(a_n)_{n\geq 0}$ be a geometric progression with common ratio, r, $|r|<1$. Let $s_1=\sum_{k=0}^{\infty} a_k$, $s_2=\sum_{k=0}^{\infty} a_{2k}$ and $s_3=\sum_{k=0}^{\infty} a_{3k}$. Suppose $\frac{s_1}{s_2}=\frac{5}{4}$. Then $\frac{s_2}{s_1}$ equals

(A) $\frac{5}{4}$ (B) $\frac{25}{24}$ (C) $\frac{21}{20}$ (D) $\frac{9}{10}$

79. An electric dipole of moment p is lying on a plane in a uniform electric field E_0 with the dipole axis along the field. The dipole on the plane is rotated by an angle 60^o keeping its centre of mass fixed. The potential energy of the dipole in its new position will be

(A) $-pE_0$ (B) $-(pE_0)/2$ (C) $-(pE_0)/3$ (D) $-(pE_0)/4$

80. Let $I_1=\int_0^1 \frac{dx}{1+\sqrt[3]{x}}$ and $I_2=\int_0^1 \frac{dx}{1+\sqrt[4]{x}}$. Then $4I_1+3I_2$ equals

(A) 3 (B) 4 (C) 6 (D) 7

Space for rough use