FIITJEE FARIDABAD

MOCK PRACTICE PAPER FOR
JEE -Mains- 2020

MOCK PRACTICE PAPER-12

Time: 3 hours ***Maximum marks: 360***

INSTRUCTIONS

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

A. General Instructions

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.

2. The Test Booklet consists of **90** questions. The maximum marks are **360.**

3. There are ***Three*** parts in the question paper. **Part 1: Chemistry, Part 2: Physics** and **Part 3 is Mathematics**. Each question is allotted **4 (four)** marks for correct response.

4. *Candidates will be awarded marks as stated above in instruction No. 3 for correct response of each question. –1 mark will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.*

5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 4 above.

Name of the Candidate :____

Batch :____________________ **Date of Examination :**____________________________

Enrolment Number :____

1. The normality of a solution of sodium hydroxide 100 mL of which contains 4 grams of NaOH is

(A) 0.1 (B) 40 (C) 1.0 (D) 0.4

2. The oxidation number of phosphorus in $Ba\left(H_2PO_2\right)_2$ is

(A) –1 (B) +1 (C) +2 (D)+3

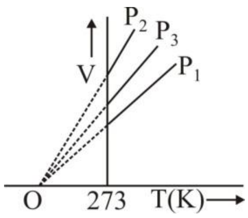
3. ${}_{18}Ar^{40}, {}_{20}Ca^{40}$ & ${}_{19}K^{40}$ are

(A) Isomers (B) Isotopes (C) Isobars (D) Isotones

4. There are 6.02×10^{22} molecules each of N_2 , O_2 and H_2 which are mixed together at 760 mm and 273 K. The mass of the mixture in grams is

(A) 6.2 (B) 4.12 (C) 3.09 (D) 7

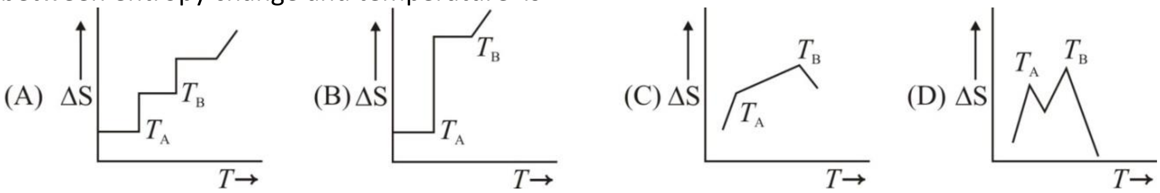
5. The volume-temperature graph of a given mass of an ideal gas at constant pressure are shown below. What is the correct order of pressures



(A) $P_1 > P_3 > P_2$ (B) $P_1 > P_2 > P_3$

(C) $P_2 > P_3 > P_1$ (D) $P_3 > P_1 > P_3$

6. If for a given substance melting point is T_B and freezing points is T_A , then correct variation shown by graph between entropy change and temperature is



7. At room temperature, for the reaction $NH_4SH_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$

(A) $K_p = K_c$ (B) $K_p > K_c$ (C) $K_p < K_c$ (D) K_p and K_c do not relate

8. Solubility of $AgCl$ will be minimum in

(A) 0.001 M $AgNO_3$ (B) Pure Water (C) 0.01 M $CaCl_2$ (D) 0.01 M $NaCl$

9. The fraction of total volume occupied by the atoms present in a simple cube is

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3\sqrt{2}}$ (C) $\frac{\pi}{4\sqrt{2}}$ (D) $\frac{\pi}{4}$

10. Identify $'X'$ in ${}_{16}S^{32} + x \rightarrow {}_{15}P^{30} + {}_2He^4$

(A) ${}_1H^1$ (B) ${}_1D^2$ (C) ${}_0n^1$ (D) e^-

Space for rough work

11. Cyclopropane rearranges to form propene 
This follows first order kinetics The half life is 13.86×10^{-3} min. The initial concentration of cyclopropane is 16 M. What will be the concentration of cyclopropane after 27.72×10^{-3} min.
(A) 0.035 M (B) 4M (C) 3.5 M (D) .35 M

12. Ce(58) is a member of ;
(A) $s-$ block (B) $p-$ block (C) $d-$block (D) $f-$ block

13. Which of the following molecule / ion does not contain unpaired electron?
(A) O_2^{2-} (B) B_2 (C) N_2^+ (D) O_2

14. Which of the following molecules has intramolecular H-bonding?
(A) Ortho-nitrophenol (B) Ortho-boric acid (C) Both (A) and (B) (D) none of these

15. Which of the following produces hydrolith with dihydrogen?
(A) Mg (B) Ca (C) Cu (D) Al

16. Select the methanides from compound given below:

Al_4C_3	Be_2C	MgC_2	BaC_2
I	II	III	IV

(A) I only (B) I and IV (C) I and II (D) I, II, III & IV

17. When iodine is dissolved in CCl_4, the colour that results is :
(A) Brown (B) Blusish green (C) Violet (D) Colorless

18. The bonds present in borazole are:
(A) $12\sigma, 3\pi$ (B) $9\sigma, 6\pi$ (C) $6\sigma, 6\pi$ (D) $9\sigma, 9\pi$

19. If $H_x[Pty_6]$, y is a monodentate charged ligand then find the out the value of x :
(A) 5 (B) 3 (C) 6 (D) None of these

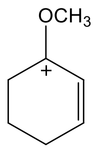
20. Select the correct order E.A.N:
(A) $[Cr(CO)_6] > [Cr(CO)_6]^{\ominus} > [Cr(CO)_6]^{\oplus}$ (B) $[Cr(CO)_6]^{+} > [Cr(CO)_6]^{\ominus} > [Cr(CO)_6]$
(C) $[Cr(CO)_6]^{\ominus} > [Cr(CO)_6] > [Cr(CO)_6]^{\oplus}$ (D) $[Cr(CO)_6]^{\ominus} = [Cr(CO)_6] > [Cr(CO)_6]$

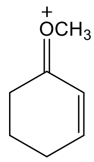
Space for rough work

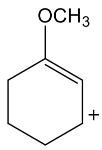
21. A complex involving dsp^2-hybridization has:
(A) A square planar geometry
(B) A tetrahedral geometry
(C) An octahedral geometry
(D) Trigonal planar geometry

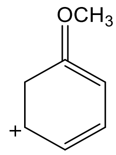
22. Which gives blood red colour with ammonium thiocyanate?
(A) Fe^{3+}
(B) Fe^{2+}
(C) Cu^{2+}
(D) Cd^{2+}

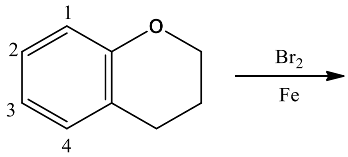
23. When H_2O_2 is added to an acidified solution of $K_2Cr_2O_7$;
(A) Solution turns green due to formation of Cr_2O_3
(B) A deep blue-violet colored compound $CrO(O_2)_2$
(C) Solution turns yellow due to formation of K_2CrO_4
(D) Solution gives green ppt. of $Cr(OH)_3$ is formed

24. Which of the following structures is not a resonance structure of the others?
(A) 

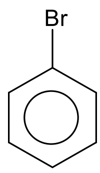
(B) 

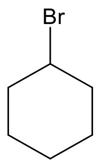
(C) 

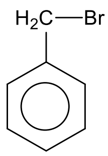
(D) 

25. 

; Substitution takes place at the positions:
(A) 1
(B) 2
(C) 3
(D) both (A) and (C)

26. Compare rate of reaction with $Ag^{\oplus}NO_3^-$ or rate of S_{N^1} reaction
(i) 

(ii) 

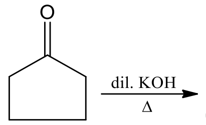
(iii) 

(A) i>ii>iii
(B) ii>iii>i
(C) iii>ii>i
(D) iii>i>ii

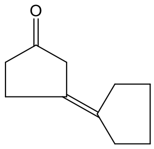
Space for rough work

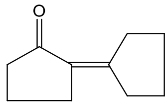
27. $Ph-\overset{18}{O}-CH_3 \xrightarrow{Conc.HI}$ Products of the reaction is:

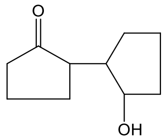
(A) $Ph-\overset{18}{O}H, CH_3-I$ (B) $Ph-I, CH_3-\overset{18}{O}H$ (C) $Ph-I, CH_3-I$ (D) $Ph-OH, CH_3I$

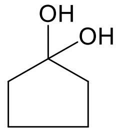
28. 

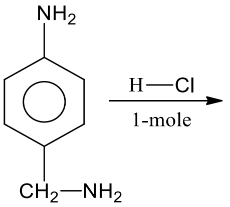
(A) ; Product (A) is:

(A) 

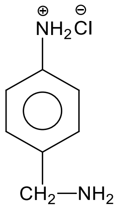
(B) 

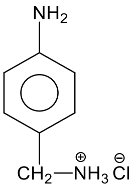
(C) 

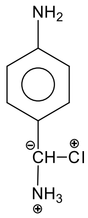
(D) 

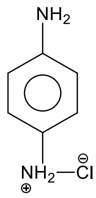
29. 

; Product formed in this reaction is:

(A) 

(B) 

(C) 

(D) 

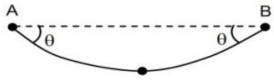
30. Glucose molecules reacts $'X'$ number of molecules of phenylhydrazine to yield osazone. The value of X is:

(A) three (B) Two (C) One (D) Four

Space for rough work

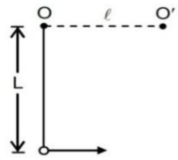
Section – 2 **PHYSICS**

1. A rope of mass m hangs between two fixed points A and B at the same level, as shown in figure. The tension at the mid point of the chain



(A) mg (B) mg cot θ (C) 2mg cot θ (D) $\frac{mg\cot\theta}{2}$

2. A particle is hanging from a fixed point O by means of a string of length L. There is a small nail O' in the same horizontal line with O at a distance ℓ (<L) from O. The minimum velocity with which particle should be projected from its lowest position in order that it may make a complete revolution round the nail.



(A) $\sqrt{3gL}$ (B) $\sqrt{3gL}$ (C) $\sqrt{g(5L-3\ell)}$ (D) $\sqrt{g(5\ell-3L)}$

3. A ball is thrown with speed v and angle of projection with horizontal is . If the coefficient of restitution between ball and horizontal plane is e then the distance travelled by the ball after long time will be

(A) $\frac{u^2\sin^2\theta}{g}\left(\frac{1}{1-e^2}\right)$ (B) $\frac{u^2\sin^2\theta}{g}\left(\frac{1}{1+e^2}\right)$ (C) $\frac{u^2\cos^2\theta}{g}\left(\frac{1}{1-e^2}\right)$ (D) None of these

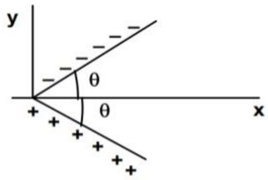
4. A uniform solid hemisphere of radius r is joined to uniform solid right circular cone of base of radius r. Both have same density. The centre of mass of the composite solid lies on the common face. The height (h) of the cone is

(A) 2r (B) √3 r (C) 3r (D) r√6

5. A constant voltage is applied between the two ends of a uniform metallic wire. Some heat is produced in it. The heat developed is doubled if:

(A) Both the length and radius of the wire are halved.
(B) Both the length and radius of the wire are doubled.
(C) The radius of the wire is doubled.
(D) The length of the wire is doubled and the radius of the wire is halved.

6. The given diagram shows two infinite line of charges having equal (in magnitude) linear charge density but with opposite sign. The electric field at any point on x axis for (x > 0) is along the unit vector



(A) $\cos\theta\hat{i}+\sin\theta j$ (B) $-j$ (C) j (D) $-\sin\theta\hat{i}+\sin\theta j$

7. Three identical particles of charges Q and mass m are placed such that they form an equilateral triangle of side . If they are released simultaneously. Their maximum speed attained by any one of the particles will be (Neglect gravity)

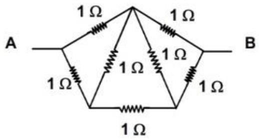
(A) $Q\sqrt{\frac{1}{2\pi\varepsilon_0 m\ell}}$ (B) $Q\sqrt{\frac{1}{6\pi\varepsilon_0 m\ell}}$ (C) zero (D) None of these

Space for rough work

8. A wire of length ℓ and resistance R is bend in form of ring the resistance between two points which is separated by angle θ

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

9. Find effective resistance between A and B.

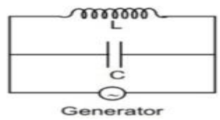


(A) 2Ω (B) 1Ω (C) $\frac{8}{7}\Omega$ (D) $\frac{6}{5}\Omega$

10. An inductance L, a capacitance C and a resistance R may be connected to an AC source of angular frequency , in three different combination of RC, RL and LC in series. The power drawn by the three combinations are P_1,P_2,P_3 respectively. Assume that $\omega L = \frac{1}{\omega C}$. Then,

(A) $P_1>P_2>P_3$ (B) $P_1=P_2<P_3$ (C) $P_1=P_2>P_3$ (D) $P_1=P_2=P_3$.

11. For the circuit shown in the figure, the current through the inductor is 0.6 A, while the current through the capacitor is 0.4 A. The current drawn from the generator is

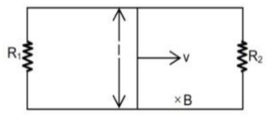


(A) 1.0 A (B) 0.4 A (C) 0.6 A (D) 0.2 A

12. Two identical satellites A and B revolve round the earth in circular orbits at distance R and 3R fromthe surface of the earth (R = radius of the earth). The ratio of the linear momenta of A and B is

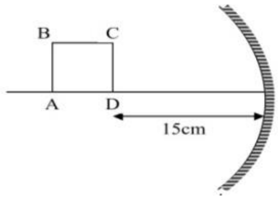
(A) 1:1 (B) 1: √2 (C) √2 : 1 (D) 2 : 1

13. A rectangular loop with a slide wire of length l is kept in a uniform magnetic field as shown in figure. The resistance of slider is R. neglecting self inductance of the loop find the current in the connector during its motion with a velocity v.



(A) $\frac{Blv}{R_1+R_2+R}$ (B) $\frac{Blv(R_1+R_2)}{R+(R_1+R_2)}$ (C) $\frac{Blv(R_1+R_2)}{RR_1+RR_2+R_1R_2}$ (D) $Blv\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}\right)$

14. A square ABCD of side 1 mm is kept at distance 15 cm in front of the concave mirror as shown in the figure. The focal length of the mirror is 10 cm. The length of the perimeter of its image will be:



(A) 8 mm (B) 2 mm (C) 12 mm (D) 6 mm

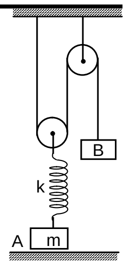
15. The decay constant of a radioactive sample is λ. The half-life and mean-life of the sample arerespectively given by:

(A) $1/\lambda$ and $(\ell n2)/\lambda$ (B) $(\ell n2)/\lambda$ and $1/\lambda$ (C) $\lambda(\ell n2)$ and $1/\lambda$ (D) $\lambda/(\ell n\,2)$ and $1/\lambda$

Space for rough work

16. Find the minimum mass of block B so that A leaves the surface when B is released from rest spring is initially at natural length

(A)m/2 (B)m/4 (C) 2 m (D) 4 m

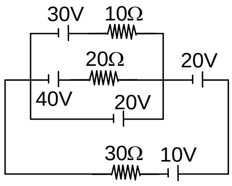


17. A cylindrical hall has a horizontal smooth floor. A ball is projected along the floor from A point on the wall in a direction making an angle θ with the radius through that point. The ball returns back to the initial point after two impacts with the wall. If the coefficient of restitution is e then $\tan^2\theta$ will be

(A) $\frac{1+e+e^2}{e^3}$ (B) $\frac{1+e}{e^2}$ (C) $\frac{e^2}{1+e}$ (D) $\frac{e^3}{1+e+e^2}$

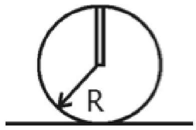
18. Find the current through 30Ω resistor which is connected in the network as shown

(A) 3A (B) 2A (C) 1A (D) None



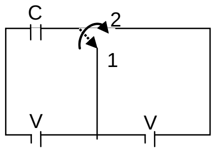
19. In the diagram shown, a rod of mass M has been fixed on a ring of the same mass. The whole system is gently displaced so that the ring starts rolling. Find out the velocity of the centre of ring when the rod becomes horizontal. Take the length of the rod to be equal to the radius of the ring

(A) $\sqrt{\frac{3gR}{4}}$ (B) $\sqrt{\frac{gR}{4}}$ (C) $\sqrt{\frac{gR}{3}}$ (D) None



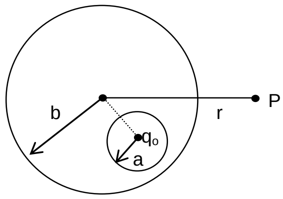
20. For the situation shown in figure. Switch is shifted from 1 to 2 at t = 0. The heat loss after a long time is

(A)CV^2 (B)$2CV^2$ (C) $\frac{1}{2}CV^2$ (D)None



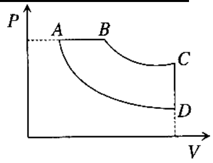
21. Spherical portion has been removed from spherical conducting sphere shown in figure. The electric field at point P is

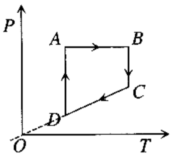
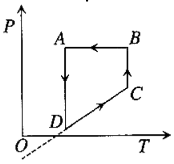
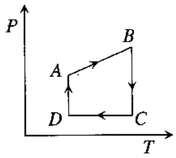
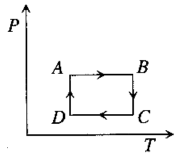
(A) $\frac{1}{4\pi\epsilon_0}\frac{q_0}{(a+r)^2}$ (B) $\frac{1}{2\pi\epsilon_0}\frac{q_0}{r^2}$ (C) $\frac{1}{4\pi\epsilon_0}\frac{q_0}{(a+b)^2}$ (D) $\frac{1}{4\pi\epsilon_0}\frac{q_0}{r^2}$



Space for rough work

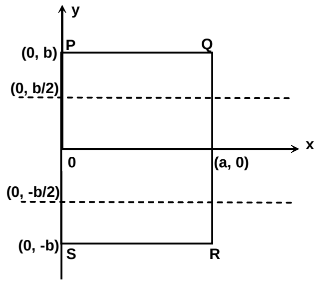
22. A cyclic process ABCD is shown in the following P-V diagram. Which of the following curves represents the same process?



(A)  (B)  (C)  (D) 

23. A uniform and constant magnetic field exists in a region as under

$B_o\hat{i}$ for $y > \frac{b}{2}$; $-B_o\hat{i}$ for $y < -\frac{b}{2}$; zero for $-\frac{b}{2} \le y \le \frac{b}{2}$ Then the current that must be passing through thearea enclosed by PQRS shown



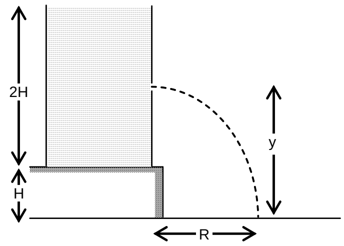
(A) $\frac{2B_oa}{\mu_o}(-\hat{k})$ (B) $\frac{2B_oa}{\mu_o}(\hat{k})$

(C) $\frac{2B_ob}{\mu_o}(-\hat{k})$ (D) $\frac{2B_ob}{\mu_o}(\hat{k})$

24. The power radiated by a black body is P, and it radiates maximum energy around the wavelength λ_0. If the temperature of black body is now changed so that it radiates maximum energy around a wavelength $\frac{3\lambda_0}{4}$, the new power radiated by it will be

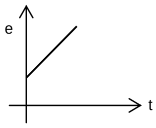
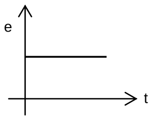
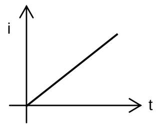
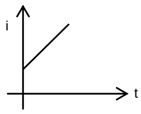
(A) $\frac{4}{3}P$ (B) $\frac{16}{9}P$ (C) $\frac{64}{27}P$ (D) $\frac{256}{81}.P$

25. A tank is filled upto a height 2H with a liquid and is placed on a platform of height H from the ground. The distance y from the ground where a small hole is made in the tank, to get the maximum horizontal range R is



(A) 2H (B) 3 H/2 (C) 5 H/4 (D) H

26. Two parallel long straight conductors lie on a smooth horizontal surface. Two other parallel conductors rest on them at right angles so as to form a square of side a initially. A uniform magnetic field B exists in vertical direction. Now all the four conductors start moving outwards with a constant velocity v. The induced e.m.f. e and induced current i will vary with time t as

(A)  (B)  (C)  (D) 

Space for rough work

27. A photon collides with a stationary hydrogen atom in ground state. Energy of the colliding photon is 10.2eV. After a time interval of the order of micro sec. Another photon collides with same hydrogen atom with an energy of 15 eV. What will be observed by the detector?
(A) 2 photon of energy 10.2eV
(B) 2 photon of energy of 1.4 eV
(C) One photon of energy 10.2eV and an electron of energy 1.4eV
(D) One photon of energy 10.2eV and another photon of energy 15eV

28. A radioactive sample with half – life = T emits $\alpha-$particles. Its total activity is A_i at some time and A_t at a later time. The number of $\alpha-$particles emitted by the sample between these two points in time is :
(A) $A_i - A_t$ (B) $\frac{T}{\ln 2}(A_i - A_t)$ (C) $\frac{\ln 2}{T}(A_i - A_t)$ (D) $\frac{T}{\ln 2}\left[\frac{1}{A_t} - \frac{1}{A_i}\right]$

29. In an ideal double slit experiment, when a glass plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass plate is:
(A) 2λ (B) $2\lambda/3$ (C) $\lambda/3$ (D) λ

30. Refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30^0. One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is:
(A) 0^0 (B) 60^0 (C) 45^0 (D) 30^0

Space for rough work

Section – 3 *MATHEMATICS*

1. The tangent to $y = ax^2 + bx + 7/2$ at $(1, 2)$ is Parallel to the normal at the point (–2, 2) on the curve $y = x^2 + 6x + 10$ then the valueof 2(a – b) is
(A) 2 (B) 3 (C) 5 (D) 7

2. If the coefficient of t^8 in $(1+t^2)^{12}(1+t^{12})(1+t^{24})$ is ${}^mC_n$, then find the greatest value of m – n.
(A) 2 (B) 4 (C) 6 (D) 8

3. If f(x) = $\{x^2\}$, where {x} denotes the fractional part of x, then
(A) f(x) is continuous at x = 2 but not at x = –2 (B) f(x) is continuous at x = –2 but not at x = 2
(C) f(x) is continuous at x = –2 and x = 2 (D) f(x) is discontinuous at x = 2 and x = –2

4. Let r be the radius of circle passing through (0, 5) and (6, 1) and whose center lies on the line 12x + 5y = 25, then value of 3r is
(A) 12 (B) 13 (C) 14 (D) 15

5. Let z_k (k = 0, 1, 2, 3, 4, 5, 6) be the roots of the equation $(z+1)^7 + (z)^7 = 0$, then $\sum_{k=0}^{6} \text{Re}(z_k)$ is equal to
(A) 0 (B) $\frac{3}{2}$ (C) $-\frac{7}{2}$ (D) 7/2

6. If f is continuous on [0, 1] such that $f(x) + f\left(x + \frac{1}{2}\right) = 1$ and $\int_0^1 f(x)\,dx = k$, then value of 2K is
(A) 0 (B) 1 (C) 2 (D) 3

7. Let a, b, c, are three distinct real numbers such that the lines ax + by + c = 0, bx + cy + a = 0 and cx + ay + b = 0 are concurrent and the line $3x + 2y - \lambda = 0$ passes though their point of intersection, then value of λ is
(A) 2 (B) 4 (C) 5 (D) 7

8. If $f(x) = 64x^3 + \frac{1}{x^3}$ and α, β are the roots of $4x + \frac{1}{x} = 2$, then
(A) $f(\alpha) = -64$ (B) $f(\beta) = -8$ (C) $f(\beta) = -16$ (D) $f(\alpha) = -24$

9. Let p and q be two statements, then $\sim(\sim p \wedge q) \wedge (p \vee q)$ is logically equivalent to
(A) q (B) p (C) $p \vee q$ (D) $p \wedge q$

10. If $f(x) = \cos^{-1}\left(\frac{\sqrt{2x^2+1}}{x^2+1}\right)$, then range of f(x) is
(A) $[0, \pi]$ (B) $\left(0, \frac{\pi}{4}\right]$ (C) $\left(0, \frac{\pi}{3}\right]$ (D) $\left[0, \frac{\pi}{2}\right)$

11. If $\lim_{\theta \to 0}\left(\frac{1 + a\cos\theta}{\theta^2} - \frac{b\sin\theta}{\theta^3}\right) = 1$, and the value of a + b is – λ, then the value of λ is
(A) 2 (B) 4 (C) 6 (D) 8

Space for rough work

12. If the system of equations $\lambda p+q+r=0, p+\lambda q+r=0, p+q+\lambda r=0$ has non-trivial solution, then the value of λ can be the roots of equation

(A) $x^3-3x+2=0$ (B) $x^3-x+2=0$ (C) $x^3+4x+1=0$ (D) $x^2-2x+2=0$

13. A closet has 5 pairs of different types of shoes. The number of ways in which 4 shoes can be drawn from it such that there will be no complete pair is

(A) 200 (B) 160 (C) 40 (D) 80

14. The following data set has a mean 14.7 and a variance of 10.01.
18, 11, 12, a, 16, 11, 19, 14, b, 13, then possible value of 2a + bcan be

(A) 33 (B) 46 (C) 64 (D) 55

15. If $S_n=1+\frac{1}{2}+\frac{1}{2^2}+.....+\frac{1}{2^{n-1}}, n\in N$, then least value of n such that $2-S_n<\frac{1}{100}$ is

(A) 8 (B) 7 (C) 9 (D) 6

16. The number of distinct normals that can be drawn from (2, −1) to the parabola $y^2+x+2y+2=0$

(A) 0 (B) 1 (C) 2 (D) 3

17. A 10 digit numbers ischosen with odd digits. If the probability that no two consecutive digits are same is $\left(\frac{4}{\lambda}\right)^{\mu}$, then the value of $(\mu-\lambda)$ is

(A) 5 (B) 2 (C) 3 (D) 4

18. The shortest distance between the skew lines $\frac{x+3}{-4}=\frac{y-6}{3}=\frac{z}{2}$ and $\frac{x+2}{-4}=\frac{y}{1}=\frac{z-7}{1}$ is

(A) 3 (B) 6 (C) 7 (D) 9

19. If $\alpha+\beta=\frac{\pi}{2}, \alpha\neq\beta$ and $\beta+\gamma=\alpha$, then the value of $\frac{\tan\alpha-\tan\beta}{\tan\gamma}$ is

(A) 1 (B) 2 (C) 3 (D) −2

20. With usual notations in a triangle ABC, if $\angle A=\frac{\pi}{2}$ and $a+b+c=\Delta$, then $b+c-a$ is equal to

(A) 1 (B) 2 (C) 3 (D) 4

21. If f(x) is a differentiable function satisfying $f'(x)<2$ for all $x\in R$ and $f(1)=2$, then greatest possible integral value of f(3) is

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

Space for rough work

22. If $0 < x < \frac{\pi}{2}, \int \sqrt{1+\sec x}\, dx = 2\sin^{-1}\left(a\sin\frac{x}{b}\right) + C$, where C is an arbitrary constant, then ordered pair (a,b) is

(A) $(1,\sqrt{2})$ (B) $(\sqrt{2},1)$ (C) $(\sqrt{2},2)$ (D) $(2,\sqrt{2})$

23. If C_1, C_2 are arbitrary constants then general solution of the differential equation $\frac{d^2y}{dx^2} = e^{-3x}$ can be expressed as

(A) $y = 9e^{-3x} + c_1x + c_2$ (B) $y = -3e^{-3x} + c_1x + c_2$ (C) $y = 3e^{-3x} + c_1x + c_2$ (D) $y = \frac{e^{-3x}}{9} + c_1x + c_2$

24. If A is a diagonal matrix of non-positive entries and order 3 such that $A^2 = I$, then

(A) There may exist some diagonal element in A which is zero. (B) Value of $|A|$ is -1
(C) A^{-1} does not exist (D) $|3 \text{ adj } 2A| = -1728$

25. Let P (3, 2), Q be reflection of P in x-axis, R be reflection of Q in x + y = 0 and S be reflection of R in origin such that PQRS is a convex quadrilateral with area k. The value of $\frac{k}{5}$ is

(A) 1 (B) 2 (C) 3 (D) 4

26. $X = \{1,2,3,4,.....10\}$ and $A \subset X; B \subset X$; where $P \subset Q$ denotes that P is subset of $Q (P \neq Q)$. Then number of ways of selecting ordered pair of sets A and B such that $A \cup B \subset X$.

(A) $4^{10} - 3^{10}$ (B) 3^{10} (C) $\frac{4^{10} - 3^{10}}{2}$ (D) $\frac{3^{10} - 1}{2}$

27. If $A = \{1,2,3,4\}$ and $f : A \to A$ is defined by $f = \{(1,3), (2,4), (3,2), (4,1)\}$, then $\underbrace{fofofo...of(x)}_{2012 \text{ times}}$ is given by

(A) {(1,2), (2,3) ,(3,1), (4,4)} (B) {(1,4), (2,1) ,(3,2), (4,3)}
(C) {(1,1), (2,2) ,(3,3), (4,4)} (D) {(1,2), (2,1) ,(3,4), (4,3)}

28. If f'(3) = 2, then the value of $\lim_{h \to 0} \frac{f(3+h^2) + f(3-h^2) - 2f(3)}{2h^2}$ is

(A) 0 (B) 2 (C) 6 (D) 8

29. Let $\vec{V}_1 = 3ax^2\hat{i} - 2(x-1)\hat{j}$ and $\vec{V}_2 = b(x-1)\hat{i} + x^2\hat{j}$, where ab < 0. The vector $\vec{V}_1$ and $\vec{V}_2$ are linearly dependent for

(A) at least one x in (0, 1) (B) at least one x in (–1, 0)
(C) atleast one x in (1 , 2) (D) no value of x in (0,1)

30. The number of values of x in the interval $\left[0, \frac{7\pi}{2}\right]$ satisfying the equation $6\sin^2 x + \sin x - 2 = 0$ is

(A) 3 (B) 5 (C) 7 (D) 9

Space for rough work

ANSWER KEY

CHEMISTRY

1. C	2. B	3. C	4. A	5. A	6. A	7. B	8. C	9. A	10. B
11. B	12. D	13. A	14. A	15. B	16. C	17. C	18. A	19. D	20. C
21. A	22. A	23. B	24. D	25. D	26. C	27. A	28. B	29. B	30. A

PHYSICS

1. D	2. C	3. D	4. B	5. B	6. C	7. A	8. A	9. C	10. C
11. D	12. C	13. C	14. C	15. B	16. B	17. D	18. C	19. D	20. C
21. D	22. A	23. A	24. D	25. B	26. A	27. C	28. B	29. A	30. C

MATHEMATICS

1. D	2. D	3. D	4. B	5. C	6. B	7. C	8. C	9. B	10. D
11. B	12. A	13. D	14. B	15. A	16. B	17. D	18. D	19. B	20. D
21. A	22. C	23. D	24. B	25. C	26. A	27. C	28. A	29. A	30. C