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JEE MAIN Session - 1 Ranks 2023

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Shift -1 10-04-2023

JEE MAIN (APRIL) 2023 (10-04-2023 Session - 2)

Mathematics | Physics | Chemistry

Sri Chaitanya IIT Academy.,India.
A.P T.S KARNATAKA TAMILNADU MAHARASTRA DELHI RANCHI
A right Choice for the Real Aspirant
ICON Central Office - Madhapur - Hyderabad

JEE Mains 2023 Memory based paper

10th April 2023 (Shift-1)

Mathematics:

1. Let the complex no z=x+iy be such is that (2z−3i)/(2z+i) is purely imaginary. If $x+y^2=0$, then y^4+y^2-y is equal to
2. If the coefficient of x^7 in expansion of $(ax-1/(bx^2))^{13}$ is equal to coefficient of x^{-5} in expansion of $(ax+1/(bx^2))^{13}$, then $a^4\ b^4$ is
3. If the order of matrix A is 3×3 and |A|=2, then the value of |3adj(|3A|A^2)| is
   (a) $3^{10}\cdot 2^{21}$
   (b) $2^{10}\cdot 3^{21}$
   (C) $2^{12}\cdot 3^{15}$
   (d) $3^{12}\cdot 2^{15}$
4. Find the value of 96cosπ/33 cos2π/33 cos4π/33……cos16π/33
   (a) 0
   (b) 1
   (C) 2
   (d) 3
5. Slope of tangent to a curve at a variable point is $(x^2+y^2)/2xy$ and y(2)=0, then y(8) is
   (a) √3
   (b) 2√2
   (C) 4√3
   (d) 6
6. Two dice are rolled and sum of numbers of two dice is N then probability that $2^N<N!$ Is m/n, where m and n are coprime, then 11m-3n is
7. Using the number 1,2,3,⋯7, total numbers of 7 digit number which does not contain string 154 or 2367 is, (repetition is not allowed)
   a) 4897
   (b) 4898
   C) 4896
   (d) 4899
8. From a square of side 30cm, the squares of side xcm is cut off to make a cuboid of maximum volume. The surface area of cuboid with open top is
   a) 400cm^2
   (b) 464cm^2
   (C) 800cm^2

d) 900cm^2

9. In a doubles badminton tournament, n couples play such that no couple plays a game together. If total number of games played is 840 , number of people who played the game are
10. The coefficient of x^7 in $(1-x+2x^3)^{13}$ is
11. A piece of square tin plate of length 30cm is converted into cube of constant volume then the area $(a)^2$ is
    A) 300cm^2
    B) 900cm^2
    C) 1200cm^2
    D) 100cm^2
12. find the sum of terms which are not divisible by ' 3 ' in the AP 3,8,13,……..373. (integer)
13. what is the sum of lone pairs in IF5 and IF7.
    (integer)
14. $9\cos\pi/33\cdot\cos2\pi/33\cdot\cos4\pi/33\cdot\cos8\pi/33.\cos16\pi/33$=?
15. 3,8,13…373 are in AP. sum of the terms not divisible by 3 .
16. Find the total number of values of $n\in Z$, given that $|n^2-10n+19|<6$.
17. There is a set of numbers {1,2,3,4,5,6,7 then find how many numbers are formed such that three numbers {1,2,4} are not together as well as {3,5,6,7} are together.
18. There is a sheet of dimension 30cm×30cm, and if we make an open box with maximum volume using this sheet, then find the surface area of
19. $\int e^{\sin2x}$ (sin2xcosx-sinx)dx=I; Then, find I(π/2)=?
20. The coefficient of x^7 in $(1-2x+x^3)^{10}$ is
21. Let f be a differentiable function x^2 f(x)-x=$4\int_0^x$tf(t)dt. If f(1)=2/3 then 18f(3) is
22. If $a^2+(ar)^2+(ar^2)^2=33033$,(a,r∈N), then the value of $a+ar+ar^2$ is
23. Shortest distance between lines (x+1)/7=(y+1)/(-6)=(z+1)/1 and (x-3)/1=(y-5)/(-2)=(z-7)/1 is
    (a) √29
    (b) 2√29
    (C) 3√29
    (d) 4√29
24. If the number of ways in which a mixed double badminton can be played such that no couples played into a same game is 840 . Then find the number of players.
25. The mean of the data

$0-10$	$10-20$	$20-30$	$30-40$	$40-50$
5	2	5	x	6

is 26 , then variable of the data is

Physics:

26. Find the equivalent capacitance across points A and B in the given electrical circuit.
    (a) C/2
    (b) 2CA
    (C) 5C/3
    (d) 3C/4
27. A particle of mass m moving with a velocity v collids with a particle of mass 2m at rest and sticks to it. Velocity of combined mass is equal to
    a) v
    (b) v/2
    (C) v/3
    (d) v/4
28. The equation of progressive wave is y=5sin(6t+0.03x). Find the speed of wave.
    200
29. The frequency of oscillation of particles in a small volume is
    A) Half the frequency of corresponding energy
    B) Same as that of energy
    C) Twice that of energy
    D) None of these
30. Earth shrinks to 1/64 times of its initial volume. Time period of Earth rotation is found to be 24/x hrs. Find the value of x.
31. For an object radiating heat at 300" " K, the wavelength corresponding to maximum intensity is λ. If the temperature of body is increased by 300" " K, the new wavelength corresponding to maximum intensity will be
    (a) λ/2
    (b) 2λ
    (c) λ
    (d) 5λ/2
32. A particle, when projected at 15° with horizontal, has a range of 50m. Find the range when projected at 45° with horizontal.
    (a) 50m
    (b) 100m
    (c) 80m
    (d) 120m
33. Statement 1:- An LCR circuit connected to an AC source has maximum average power at resonance.
    Statement 2:- A resistor only circuit with zero phase difference has maximum average power.
    a) (1) and (2) both are correct
    b) (1) is correct but (2) is incorrect
    c) (1) is incorrect but (2) is correct
    d) (1) and (2) both are incorrect
34. A monoatomic gas initially at pressure P and volume V is compressed to 1/8th of its volume adiabatically. Final pressure of the gas is equal to
    (a) 4P
    (b) 8P

(c) 16P
(d) 32P

35. What is the maximum percentage error in the measurement of quantity l, if it is given by $l=(a^2 b^3)/(c\sqrt{d})$. Given the percentage error in the calculation of a,b,c and d are 1%,2%,3% and 4% respectively.
(a) 4%
(b) 12%
(c) 9%
(d) 13%

36. A conducting rod of length 1m is moved across a magnetic field of 0.15" " T, with constant speed of 4m/s. Find force (in N) on rod.

37. 10 resistors each of 10Ω resistance when connected together give minimum equivalent resistance R_1 and maximum equivalent resistance R_2 among various possible combinations. So R_2/R_1 is equal to

38. In an AM wave, amplitude of modulating wave =3 units and amplitude of carrier wave =15 units. Find the ratio of maximum to minimum intensity I_max/I_min .

39. An object is placed in front of a plane mirror 12cm away from it. The object is kept fixed while the plane mirror is shifted towards the object by a distance of 4cm. The length of the shift in the position of image is equal to cm.

40. For a particle performing linear SHM, its position (x) as a function of time (t) is given by $x=A\sin(\omega t+\delta)$. Given that, at t=0, particle is at +A/2 and is moving towards x=+A. Find δ
(a) π/3 rad
(b) π/6 rad
(C) π/4 rad
(d) 5π/6 rad

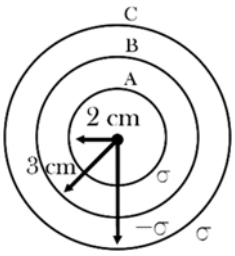
41. Angular momentum of an e^- in first Bohr's orbit is L. The change in angular momentum, if it jumps in the second orbit, will be
(a) L
(b) 2L
(C) 3L
(d) 1.5L

42. The correct statements are
(a) a,d
(b) b,c
(C) b,d
(d) a,c

43. Decay constant for a radioactive nuclide is given to be 2×10^3. If molar mass of sample is 60gm then activity of 0.3μg sample is equal to (in disintegration/seconds)
a) 6.023×10^{15}
(b) 6.023×10^{18}
(C) 6.023×10^{12}
(d) 3.012×10^{12}

44. Three concentric shell A,B and C having surface charge density σ,-σ and σ respectively. The radius of A and B are 2cm and 3cm respectively. Electric potential at surface A is V_A and at C is V_C. If $V_A=V_C$ then find the radius of C in cm.

45. Three concentric shell A,B and C having surface charge density σ,-σ and σ respectively. The radius of A and B are 2cm and 3cm respectively. Electric potential at surface A is V_A and at C is V_C. If $V_A=V_C$ then find the radius of C in cm.



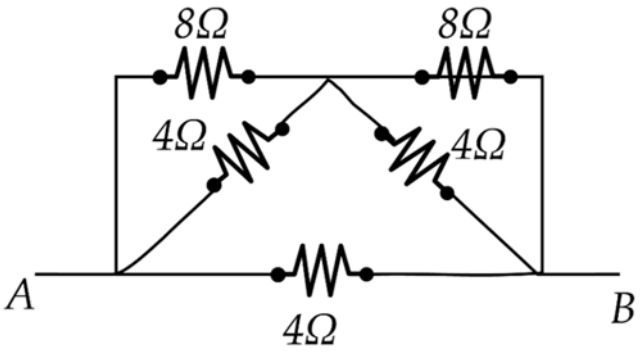
46. A monoatomic gas initially at pressure P and volume V is compressed to 1/8th " of its volume adiabatically. Final pressure of the gas is equal to

47. For a particle performing linear SHM, its position (x) as a function of time (t) is given by $x=A\sin(\omega t+\delta)$. Given that, at t=0, particle is at +A/2 and is moving towards x=+A. Find δ

48. An object weights 200N at surface of earth. Fin g the weight at a depth of R/2, where R is radius of earth:.
    a) 100N
    b) 300M
    c) 50M
    d) 150N

49. Equation of progressive wave $y=5\sin(6t+0.003x)$. Find the speed of wave.

50. The given graph shows the position (x)- time (t) relation for two students, A and B from school to their home. Consider the following statements.



    a) A is faster than B
    b) B is faster than A
    c) B lives further away than A
    d) A lives further away than B

Chemistry

1. The decay constant for a radioactive nuclei is 15×10^{-5} s^{-1}. Atomic weight of the substance is 60" " g $mole^{-1}$ ($N_A=6\times10^{23}$). The activity of 1.0μg of the substance is $\times10^{10}$Bq
2. The angular momentum for the electron in Bohr s orbit is L If the electron is assumed to revolve in 2nd orbit of hydrogen atom, then change in angular momentum will be
3. The de-broglie wavelength of a molecule in a gas at room temperature (300" " K) is λ_1. If the temperature of the gas is increased to 600" " K then the de-broglie wavelength of same gas molecules becomes.
4. Enthalpy of adsorption and enthalpy of formation of micelle are respectively
   a) Positive, Positive
   b) Positive, Negative
   c) Negative, Positive
   d) Negative, Negative
5. How many of the following are bent in shape?
   SO_2,O_3,I_3,N_3
6. The pressure value of a gas is 930.2" " mmHg. The volume is then reduced to 40% of its initial value at a constant temperature. Then what is the final pressure (in mmHg)
7. Prolongated heating of ferrous ammonium sulphide is avoided to prevent:
   a) Oxidation
   b)Reduction
   c) Hydrolysis
   d) Breaking
8. Read the following two statements.
   Statement I : Potassium dichromate is used in volumetric analysis.
   Statement II: $K_2Cr_2O_7$ is more soluble in water than $Na_2Cr_2O_7$
   (a) Both statements I and II are correct.
   (b) Both statements I and II are incorrect.
   (c) Statement I is correct and II is incorrect
   (d) Statement I is incorrect and II is correct.
9. The degree of dissociation of monobasic acid is 0.3 . By what percent is the observed depression in freezing point greater than the calculated depression in freezing point ?
10. Number of Diamagnetic & low spin species
    A $[Co(NH_3)_6]^{3+}$
    B $[CoCl_6]^{3-}$
    C $[CoF_6]^{3-}$
    D $[Fe(H_2O)_6]^{3+}$]
11. Find Number of moles and molecules of Oxygen at STP, given that volume of oxygen is 2.875" " L.
12. Which one does not stabilize 2°&3° structure of proteins
    A Van Der wads
    B H-Bonds
    C S-S bonds
    D O-O bonds
13. Prolong heating is avoided during preparation of ferrous ammonium sulphate to prevent

A Oxidation
B Hydrolysis
C Reduction
D Breaking

14. which of the following cannot stabilize secondary and tertiary proteins?
a) hydrogen bonding
b) vanderwaals forces
c) ionic bonds
d) covalent bonds

15. In the process of column chromatography the products A And B are separated A is executed first then B is
A)low Rf, weaker adsorption
B)low Rf, stronger adsorption
C)high Rf, stronger adsorption
D) high Rf, weaker adsorption

16. which of the following is used as a stabilizer in concentration of sulphide ore by froth flotation process?
a) ethyl xanthate
b) pine oil
c) cresol
d) olive oil

17. $Na_2O + H_2O \rightarrow 2X$
$Cl_2O_7 + H_2O \rightarrow 2Y$)
Sum of Number of Oxygen atoms in X and Y.

18. The pair of compound from the following pairs having both the compounds with net zero dipole moment is:
a CH_2Cl_2;$CHCl_3$
b 1,4-dichlorobenzene ; 1,3,5-trichlorobenzene
C Benzene; P-Anisidine
d Cis-dichloroethene; Trans-dichloroethene

19. Mixture of A and B is added to column containing adsorbent for separation using a solvent. A is eluted first and B is eluted last. Then B has:
a High R_f, less adsorption
b Low R_f, strongly adsorbed
C High R_f, strong adsorption
d Low R_f, weakly adsorbed

20. Find out IT_1-T_2 I for a solution of 0.1 molal weak acid H_A, if K_f of water =1.86" " $Kkgmo^{-1}$).
T_1= Freezing point of solution assuming no dissociation of acid
T_2= Freezing point of solution assuming degree of dissociation (α)=0.3.
(a) 0.0324
(b) 0.055
(C) 0.0257
(d) 0.8742

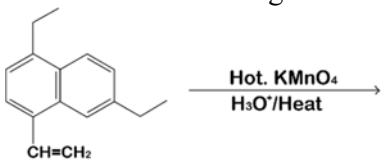
21. Statement I : Reduction potential M^{3+}/M^{2+}) is more for Fe than Mn
Statement II:V^{2+} has magnetic moment between 4.4-5.2BM

a Both Statement I and Statement II are correct.
b) Both Statement I and Statement II are incorrect.
C Statement I is correct but Statement II is incorrect
(d) Statement I is incorrect but Statement II is

22. Which stabilizer is used for concentrating sulphuric ore?

23. Which of the following compounds do not exist?
    i. $BeCl_2$,
    ii. NaO_2,
    iii. $PbEt_4$,
    iv. $(NH_4)_2$ B

24. Consider the following reaction. Find the product ' P '.



25. Match column I with column II.

Column I	Column II
A. Dacron	P. Thermosetting
B. Urea formaldehyde resin	Q. Biodegradable
C. Nylon-2, Nylon-6	R. Polyester
D. Nylon-6,6	S. Used for making bristles of brushes

a A-R, B-P, C-S, D-Q
b A-P, B-R, C-Q D-S
C A-R, B-P, C-Q, D-S
d A-A, B-R, C-S, D-Q