PREVIOUS IPE PAPER

Q1 AP - MAY 2024

MATHS - 2A

Time : 3 Hours | Max.Marks : 75

SECTION-A

I. Answer ALL the following VSAQ: $10 \times 2 = 20$

1. If $z = (\cos\theta, \sin\theta)$, find $\left(z - \frac{1}{z}\right)$
2. Express $1-i$ in the modulus- amplitude form.
3. If $x=\cos\theta+i\sin\theta$ then find $x^6 + \frac{1}{x^6}$
4. Form quadratic equation whose roots are $\frac{p-q}{p+q}, -\frac{p+q}{p-q}$.
5. If ${}^{12}P_r = 1320$ find r
6. Find the number of ways of forming a committee of 5 members from 6 men & 3 ladies.
7. If ${}^{22}C_r$ is the largest binomial coefficient in the expansion of $(1+x)^{22}$, find the value of ${}^{13}C_r$.
8. Find the mean deviation about median for the data 4, 6, 9, 3, 10, 13, 2
9. If $-1, 2, \alpha$ are the roots of $2x^3+x^2-7x-6=0$ then find α.
10. The mean and variance of a binomial distribution are 4 and 3 respectively. Find the distribution and find $P(X\geq 1)$

SECTION-B

II. Answer any FIVE of the following SAQs: $5 \times 4 = 20$

11. If $z = 3 - 5i$ then show that $z^3-10z^2+58z - 136 = 0$
12. If x is real, prove that $\frac{x}{x^2-5x+9}$ lies between 1 and $\frac{-1}{11}$.
13. If the letters of the word MASTER are permutted in all possible ways then find rank of REMAST.
14. Simplify ${}^{34}C_5 + \sum_{r=0}^{4} {}^{(38-r)}C_4$
15. Resolve $\frac{x+4}{(x^2-4)(x+1)}$ into partial fractions.
16. If A,B,C are three events, then show that
    $P(A\cup B\cup C) = P(A)+P(B)+P(C)-P(A\cap B)-P(B\cap C) -P(C\cap A)+P(A\cap B\cap C)$
17. Let A and B are independent events with P(A) = 0.2,P(B)= 0.5, find (i) P(A/B)(ii) P(B/A) (iii) $P(A\cap B)$

SECTION-C

III. Answer any FIVE of the following LAQs: $5 \times 7 = 35$

18. If $\cos\alpha+\cos\beta+\cos\gamma=0=\sin\alpha+\sin\beta+\sin\gamma$, then show that
    (i) $\cos3\alpha+\cos3\beta+\cos3\gamma=3\cos(\alpha+\beta+\gamma)$ (ii) $\sin3\alpha+\sin3\beta+\sin3\gamma=3\sin(\alpha+\beta+\gamma)$
19. Solve $x^4+x^3-16x^2-4x+48=0$, given that the product of two of its roots is 6.
20. If P and Q are the sum of odd terms and the sum of even terms respectively, in the expansion of $(x+a)^n$ then prove that (i) $P^2 - Q^2 = (x^2-a^2)^n$ (ii) $4PQ=(x + a)^{2n}-(x-a)^{2n}$
21. Find the sum of the infinite series $1+\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+....\infty$
22. Find the mean deviation about the mean for the following continuous distribution:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	6	5	8	15	7	6	3

23. Three urns have the following composition of balls
    Urn I: 1 white, 2 black Urn II: 2 white, 1 black Urn III: 2 white, 2 black
    One of the urns is selected at random and a ball is drawn. It turns out to be white. Find the probability that it came from urn III.
24. A random variable x has the following probability distribution

$X=x_i$	0	1	2	3	4	5	6	7
$P(X=x_i)$	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (i) k (ii) the mean (iii) $P(0<X<5)$

PREVIOUS IPE PAPER

AP MAY-2024

MATHS - 2B

Time : 3 Hours **Max.Marks : 75**

SECTION-A

I. Answer ALL the following VSAQ: **10 × 2 = 20**

1. Find the equation of the circle passing through (3,4) and having the centre at (–3,4)
2. If (4,k) and (2,3) are conjugate points with respect to the circle $x^2 + y^2 = 17$ then find k.
3. Find the equation of the radical axis of the circles $2x^2+2y^2+3x+6y-5=0, 3x^2+3y^2-7x+8y-11=0$
4. Find the equation of the parabola whose vertex is (3,−2) , focus is(3,1)
5. If eccentricity of a hyperbola is 5/4, then find eccentricity of its conjugate hyperbola.
6. Evaluate $\int \frac{\sin(\log x)}{x}\,dx$
7. Evaluate $\int \frac{dx}{(x+5)\sqrt{x+4}}$
8. Evaluate $\int_0^{\pi/4} \sec^2\theta\, d\theta$
9. Evaluate $\int_0^{\pi/2} \sin^5 x \cos^4 x\, dx$
10. Find the order and degree of $\left(\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3\right)^{6/5} = 6y$

SECTION-B

II. Answer any FIVE of the following SAQs: **5 × 4 = 20**

11. Find the length of the chord intercepted by the circle $x^2+y^2-8x-2y-8=0$ on the line $x+y+1=0$
12. Find the equation of the circle passing through the points of intersection of the circles $x^2+y^2-8x-6y+21=0, x^2+y^2-2x-15=0$ and (1, 2)
13. Find the eccentricity, coordinates of foci, length of latus rectum and equations of directrices of the ellipse $9x^2+16y^2-36x+32y-92=0$.
14. P.T the condition for a straight line y = mx + c to be a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is $c^2=a^2m^2+b^2$.
15. Find the equations of the tangents to the hyperbola $3x^2-4y^2=12$, which are
    (i) parallel and (ii) perpendicular to the line y = x–7
16. Evaluate $\int_0^{\pi/2} \frac{a\sin x + b\cos x}{\sin x + \cos x}\,dx$
17. Solve $(1+x^2)\left(\frac{dy}{dx}\right) + 2xy - 4x^2 = 0$

SECTION-C

III. Answer any FIVE of the following LAQs: **5 × 7 = 35**

18. Find the equation of the circle passing through the points (3,4), (3,2) and (1,4).
19. Show that the circles $x^2+y^2-6x-2y+1=0$ and $x^2+y^2+2x-8y+13=0$ touch each other. Find the point of contact and the equation of the common tangent at their point of contact.
20. Find the equation of the parabola passing through the points (–1,2), (1,–1),(2,1) and having its axis parallel to the x-axis.
21. Evaluate the reduction formula for $I_n=\int \sin^n x\,dx$ and hence find $\int \sin^4 x\,dx$.
22. Evaluate $\int \frac{dx}{3\cos x + 4\sin x + 6}$
23. Evaluate $\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}\,dx$
24. Solve $(x^2+y^2)dx=2xydy$

PREVIOUS IPE PAPER

AP MAY-2024

SR.PHYSICS

Time : 3 Hours **Max.Marks : 60**

SECTION-A

I. Answer all questions : **10 × 2 = 20**

1. What is dispersion ? Which colour gets relatively more dispersed ?
2. Distinguish between ammeter and voltmeter.
3. Define magnetic declination.
4. A bar magnet of length 0.1 m and with a magnetic moment of 5 Am^2 is placed in a uniform magnetic field of intensity 0.4 T, with its axis making an angle of 60° with the field. What is the torque on the magnet ?
5. What is transformer ratio ?
6. Give two uses of infrared rays.
7. What is photoelectric effect ?
8. What is the de Broglie wave length associated with an electron, accelerated through a potential difference of 100 volts?
9. Draw the circuit symbols for p-n-p and n-p-n transistors.
10. Mention the frequency range of speech signals.

SECTION-B

II. Answer any six of the following Questions. **6 × 4 = 24**

11. Define critical angle. Explain total internal reflection using a neat diagram.
12. How do you determine the resolving power of your eye?
13. Derive the equation for the couple acting on an electric dipole in a uniform electric field.
14. Explain the behaviour of dielectrics in an external field.
15. What are the basic components of a cyclotron? Mention its uses.
16. Describe the ways in which Eddy currents are used to advantage.
17. The wavelength of the first member of Lyman series is 1216 Å. Calculate the wavelength of second member of Balmer series.
18. Distinguish between Half wave rectifier and full wave rectifier

SECTION-C

III. Answer any two of the following Questions. **2 × 8 = 16**

19. (a) How are stationary waves formed in closed pipes ? Explain the various modes of vibration and obtain relations for their frequencies.
    (b) A closed organ pipe 70cm long is sounded. If the velocity of sound is 331m/s, what is the fundamental frequency of vibration of the air column?
20. State Kirchoff's law for an electrical network. Using these laws deduce the condition for balance in a Wheatstone bridge.
21. (a) Explain the principle and working of a nuclear reactor with the help of a labelled diagram.
    (b) If one microgram of $_{92}U^{235}$ is completely destroyed in an atom bomb, how much energy will be released ?

PREVIOUS IPE PAPER

AP MAY-2024

SR.CHEMISTRY

Time : 3 Hours **Max.Marks : 60**

SECTION-A

I. Answer ALL questions : **10 × 2 = 20**

1. Define Osmotic pressure.
2. What is a galvanic cell or voltaic cell? Give one example.
3. What is the role of cryolite in the metallurgy of aluminium?
4. Ammonia is good complexing agent. Explain with an example.
5. What is inert pair effect?
6. Why Zn^{2+} is diamagnetic whereas Mn^{2+} is paramagnetic?
7. What is PHBV? How is it useful to man?
8. What is vulcanisation of Rubber?
9. What are artificial sweetening agents? Give example.
10. What are antiseptics? Give example.

SECTION-B

II. Answer any SIX of the following Questions. **6 × 4 = 24**

11. Derive Bragg's equation.
12. What is relative lowering of vapuor pressure? How is it useful to determine the molar mass of a solute?
13. What is catalysis? How is catalysis classified? Give two examples for each type of catalysis.
14. Differentiate roasting and calcination with examples.
15. Mention the structure of a) XeF_2 and b) XeF_4
16. Write the characteristics properties of transition elements.
17. What are hormones? Give one example for each.
    (i) steroid hormones (ii) Poly peptide hormones and (iii) amino acid derivatives.
18. Which compound in each of the following pairs will react faster in S_N2 reaction with –OH?
    (i) CH_3Br or CH_3I (ii) $(CH_3)_3CCl$ or CH_3Cl

SECTION-C

III. Answer any two of the following Questions. **2 × 8 = 16**

19. Describe the following reactions:
    a) Carbylamine reaction b) Gattermann reaction c) HVZ reaction d) Aldol condensation
20. a) Describe the salient features of the collision theory of reaction rates of bimolecular reactions.
    b) State and explain Kohlrausch's law of independent migration of ions.
21. (a) How is Chlorine prepared in the laboratory? How does it react with the following
    (a) hot. con. NaOH (b) acidfied $FeSO_4$
    (b) How is ozone prepared from oxygen? Explain its reaction with (a) C_2H_4 (b) KI