SECTION - I

This section contains 10 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which ONLY ONE is correct.

MATHEMATICS

01. What is the correct order $2^{800}, 3^{600}, 5^{400}, 6^{200}$

(A) $2^{800} < 3^{600} < 5^{400} < 6^{200}$

(B) $6^{200} < 2^{800} < 5^{400} < 3^{600}$

(C) $6^{200} < 5^{400} < 3^{600} < 2^{800}$

(D) $3^{600} < 2^{800} < 5^{400} < 6^{200}$

02 If a polynomial $f(x)$ is divided by $(x-a)(x-b)$, the remainder is

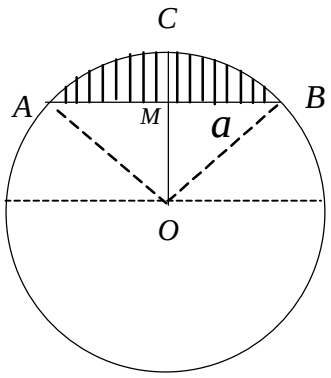
(A) $\dfrac{(x-a)f(a)-(x-b)f(b)}{a-b}$

(B) $\dfrac{(x-a)f(b)-(x-b)f(a)}{b-a}$

(C) $\dfrac{(x-a)f(b)-(x-b)f(a)}{a-b}$

(D) $\dfrac{(x-a)f(a)-(x-b)f(b)}{b-a}$

03. The shaded region is segment of a circle. AB is a chord of the circle, M is mid point of AB, C is on the cirumference and CM perpendicular AB. If MB = a and $CM = a\left(2-\sqrt{3}\right)$, what is the area of the shaded region ?



(A) $\dfrac{1}{4}\pi a^2$ (B) $\dfrac{1}{6}\pi a^2$

(C) $\dfrac{1}{6}\left(\pi^2+\sqrt{3}\right)a^2$ (D) $\dfrac{a^2}{3}\left(2\pi-3\sqrt{3}\right)$

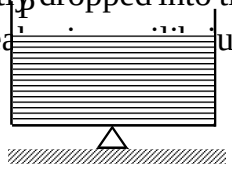
04. If h be the height and α be the semi vertical angle of a right circular cone, then its volume is

(A) $\dfrac{1}{3}\pi h^3 \tan^2\alpha$ (B) $\dfrac{1}{3}\pi h^2 \tan^2\alpha$

(C) $\dfrac{1}{3}\pi h^2 \tan^3\alpha$ (D) $\dfrac{1}{3}\pi h^3 \tan^3\alpha$

SCIENCE

05. A beaker containing water is just supported by a sharp support as shown in figure . If a cork is gently dropped into the water at P to keep the bea[illegible]um,



(A) the support is to be shifted towards left

(B) the support is to be shifted towards right

(C) the support can be shifted in any direction

(D) the support need not be shifted

06. A 10 kg block is dropped from a height of 10 m. If the kinetic energy of the body while reaching the ground is 800 J, the loss in energy due to the air resistance is (g = 10 m/s^2)

(A) 800 J (B) 400 J

(C) 1000 J (D) 200 J

07. Two bulbs B_1 of 40 W and B_2 of 100 W are connected across mains . Consider the following statements

Statement - 1 : If the bulbs are connected in series 40 W bulb glows brighter than 100 W bulb

Statement - 2 : If the bulbs are connected in parallel 100 W bulb glows brighter than 40 W bulb .

(A) Statement 1 is TRUE and 2 is FALSE
(B) Both the statements are WRONG

(C) Statement 1 is FALSE and 2 is TRUE
(D) Both the statements are 'TRUE'

08. The angle between the incident and reflected rays using a plane mirror is $_{100^0}$. The mirror is turned thorugh an angle of $_{20^0}$. The angle between the two rays is now

(A) $_{80^0}$ (B) $_{120^0}$

(C) $_{80^0}$ or $_{120^0}$ (D) $_{60^0}$ or $_{140^0}$

09. How many moles of e^- weigh one Kg

(A) 6.023×10^{23} (B) $\frac{1}{9.108} \times 10^{31}$

(C) $\frac{6.023}{9.108} \times 10^{54}$ (D) $\frac{1}{9.108 \times 6.023} \times 10^{8}$

10. Which of the following compounds will show geometrical isomerism?

(I) 2–butene (II) Propene

(III) 1–phenylpropene

(IV) 2–methyl–2–butene

Choose the correct option

(A) I and III (B) I and IV

(C) II and III (D) III and IV

11. **Assertion :**Oxygen is more electronegative than sulphur, yet H_2S is acidic, while H_2O is neutral.

Reason : H–S bond is weaker than O–H bond.

(A) both (A) and (R) are true and (R) is the correct explanation of (A)

(B) both (A) and (R) are true but (R) is not correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) is false and (R) is true

12. The quantum numbers of four electrons (e1 to e4) are given below

	n	***l***	**m**	**s**
e1	3	0	0	+1/2
e2	4	0	0	1/2
e3	3	2	2	–1/2
e4	3	1	–1	1/2

The correct order of decreasing energy of these electrons is:

(A) e4 > e3 > e2 > e1

(B) e2 > e3 > e4 > e1

(C) e3 > e2 > e4 > e1

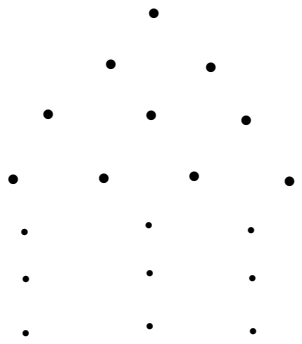
(D) e3 > e2 > e1 > e4

SECTION - II

Comprehensive type questions :

Passage : 1

Let us look at the following triangular arragements of dots. First row has one dot, second row two dots and so on and nth row will have n dots. Let t_n be total number of dots in such a triangular arrangement of n rows of dots. Answer questions 16 and 17 below:



13. t_n^2 =

(A) $1+2+3+....+n$

(B) $1^2+2^2+3^2+.....+n^2$

(C) $1^3+2^3+3^3+.....+n^3$

(D) $2t_n-1$

14. $t_1+t_2+....+t_n$ =

(A) $\frac{1}{6}n(n+1)(2n+1)$

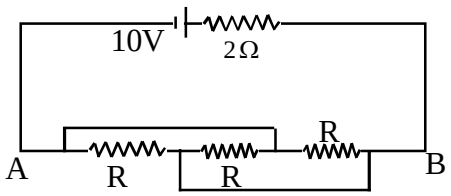
(B) $\frac{1}{6}n(n+1)(n+2)$

(C) $\frac{1}{12}n(n+1)(2n+1)$

(D) $\frac{1}{12}n(n+1)(n+3)$

Passage - 2

Consider the circuit shown in figure



15. Find the value of R at which the power generated between A and B points is maximum

(A) 3Ω (B) 2Ω
(C) 4Ω (D) 6Ω

16. Maximum power supplied by the battery is

(A) 100 W (B) 50 W
(C) 25 W (D) 12.5 W

Passage - *3 :*

Four elements P, Q, R & S have ground state electronic configuration as:

$P \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$
$Q \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$

$R \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^3$
$S \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^1$

17. Comment which of the following option represent the correct order of true (T) & false (F) statement.

I size of P < size of Q
II size of R < size of S

III Element P can form oxides like P_4O_6 and P_4O_{10}.

IV Element Q can form oxides like Q_2O.

(A) TTTT (B) TTTF
(C) FFTT (D) TTFF

18. Order of IE_1 values among the following is

(A) P > R > S > Q (B) P < R < S < Q
(C) R > S > P > Q (D) P > S > R > Q

SECTION - III

This section contains 2 questions. Each question contains statements given in two columns, which have to be matched. Any given statement in Column I can have correct matching with ONE statement in Column II.

M1) The centres of the two circles are r_1 and r_2 and 'd' is the distance between the centres

Column - I	***Column - II***
values of r_1, r_2, d	number of common tangents to the circles
19. $r_2 = 1,\ r_1 = 4,\ d = 5$	(A) 1
20. $r_2 = 2,\ r_1 = 7,\ d = 5$	(B) 4
21. $r_2 = 3,\ r_1 = 5,\ d = 12$	(C) 2
22. $r_2 = 3,\ r_1 = 2,\ d = 4$	(D) 3

S2)

Column I	**Column II**
(23) Magnesium sulphate	(A) Epsom salt
(24) Calcium hydroxide	(B) Gypsum
(25) Calcium carbonate	(C) Dolomite
(26) Calcium sulphate	(D) Slaked lime

SECTION - IV

Reasoning Type Questions :

27. Choose the word which is least like the other words in the group.

    (A) Biscuits (B) Chocolates (C) Cake (D) Bread

28. Clever is to Beautiful as Sour is to .....

    (A) Lemon (B) Cunning (C) Loathing (D) Taste

29. In a certan code language, the word 'RECTANGLE' is coded as TGEVCPING, then how is the word 'RHOMBUS' coded ?

    (A) TJOQDWV (B) UVWTJQN (C) TJQODWU (D) JTQOEWN

30. A bus for Delhi leaves every 30 minutes from a bus stand. An enquiry clerk told a passenger that the bus had already left 10 minutes ago and the next bus will leave at 9:35 am. At what time did the enquiry clerk give this information to the passenger ?

    (A) 9.10 am (B) 9.15 am (C) 8.55 am (D) 8.08 am