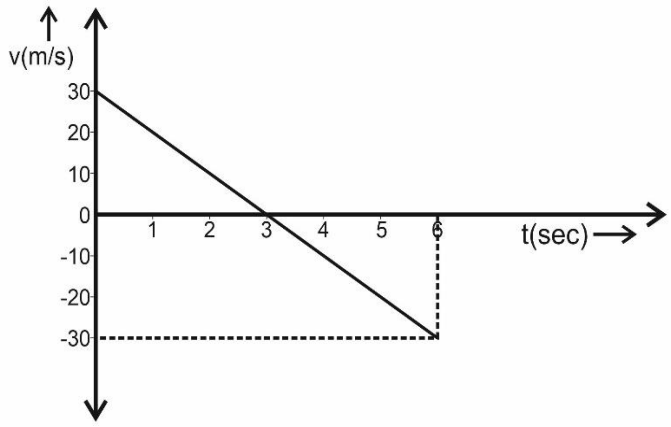
PHYSICS QUESTION

1. The velocity ~ time graph of a stone thrown vertically upward with an initial velocity (taken +ve upward) of 30m/s is shown in the figure below. What is the maximum height to which the stone rises?



a) 30m
b) 60m
c) 45m
d) 90m

2. A child accompanying a passenger in a train threw a ball vertically upward in his playful mood inside the train. The ball instead of returning to his hand held at the same place fell down in front of him. What would you think about the state of motion of the train at that time.
   a) The train was moving uniformly.
   b) The train was accelerating uniformly.
   c) The train was standing at rest.
   d) The train was retarding its motion by applying break.

3. Read the assertion and reason carefully to mark the correct option out of the options given below:
   Assertion (A): Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with the same speed.
   Reason (R) : The maximum height and downward velocity attained at the point of projection are independent of the mass of the ball.
   a) Both assertion and reason are true and the reason is the correct explanation of the assertion.
   b) Both assertion and reason are true but reason is not the correct explanation of the assertion.
   c) Assertion is true but reason is false
   d) Assertion and reason both are false
4. In which of the following cases forces may not be required to keep the

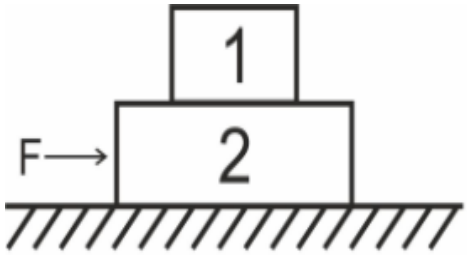
(a) particle going in a uniform circular motion

(b) particle going along a straight line

(c) momentum of the particle constant

(d) acceleration of the particle constant

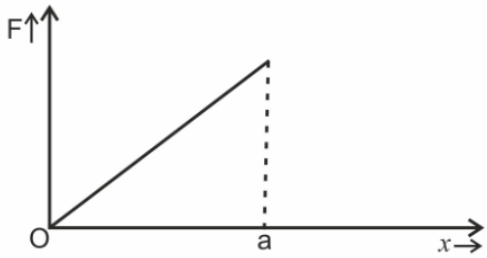
5. A system of two blocks (1 and 2) is placed on a rough horizontal ground as shown in the figure. A force F is applied horizontally on block 2 such that both the blocks start moving together. If f_1, is the frictional force on body 1 due to the body 2 and f_2 is the fiction of the ground on body 2, then which of the following statements is correct



   a) f_1 and f_2 are in forward direction
   b) f_1 and f_2 are in backward direction
   c) f_1 is in forward and f_2 is in backward direction
   d) f_1 is in backward and f_2 is in forward direction

6. A gun of mass 10kg fires 4 bullets per second. The mass of each bullet is 20g and the velocity of the bullet when it leaves the gun is 300m/s. The force required to hold the gun while firing is
   a) 6N
   b) 8N
   c) 24N
   d) 240N

7. Under the action of a force F directly proportional to the displacement (x) as shown in the figure with slope k, the position of a body changes from x = 0 to x = a. The work done by the force in the process is



   a) $\frac{1}{2}kx^2$
   b) ka^2
   c) kxa
   d) $\frac{1}{2}ka^2$

8. A fissile object of certain mass is thrown vertically upward such that at the highest point of its projection it splitted up into two parts with mass ratio 2:3 moving horizontally opposite to each other at the time of splitting. The ratio of their kinetic energy at that instant is
   a) 2:3
   b) 3:2
   c) 4:9
   d) 9:4

9. A car of mass 1250 *kg* is moving at 30*m*/*s*. Its engine delivers 30 *kW* while resistive force due to surface is 750*N*. The maximum acceleration the engine can produce is

(a) $\frac{1}{3} m/s^2$ (b) $\frac{1}{4} m/s^2$

(c) $\frac{1}{5} m/s^2$ (d) $\frac{1}{6} m/s^2$

10. Two spheres of same material, each of radius R are placed in contact with each other on a horizontal surface .The force of attraction between these two spheres will be proportional to
(a) R^{-2}
(b) R^2
(c) R^4
(d) None of these

11. The height from earth surface at which the weight of a body becomes $\frac{1}{16}$th its weight on the surface of earth (radius R) is

a) 4R b) 5R c) 15R d) 3R

12. Which one of the following statements is not true for the appearance of blue colour of sky.
a) Human eyes are more sensitive to the scattered blue light.
b) Violet and blue lights get scattered more than the lights of other colours by the atmosphere.
c) Blue light moves faster in air than light of any other colour.
d) Light of all other colours except violet and blue scatter least by the atmosphere.

13. Green light of frequency 5494×10^2 GHz is incident on air-glass interface.
If the refractive index of glass is 1.5, the frequency of this light in glass would be

a) $3662 \times 10^2 GH_z$

b) $8241 \times 10^2 GH_z$

c) $5494 \times 10^2 GH_z$

d) None of the above

14. Two plane mirrors are perpendicular to each other. A ray after suffering reflection form the two mirrors will be
    a) Perpendicular to first mirror
    b) Parallel to first mirror
    c) Perpendicular to original ray
    d) Parallel to original ray
15. An object is placed in front of a concave mirror between its pole and the focus. What would be correct stating the nature, size and position of the image?
    a) A real, inverted image diminished in size between f and 2f.
    b) A real, inverted image equal in size at 2f.
    c) A real, inverted image highly magnified beyond 2f.
    d) A virtual, erect image and magnified behind the mirror.
16. Two electric bulbs rated P_1 and P_2 watt at V volt are connected in series across V volt mains. Then their total power consumption P is

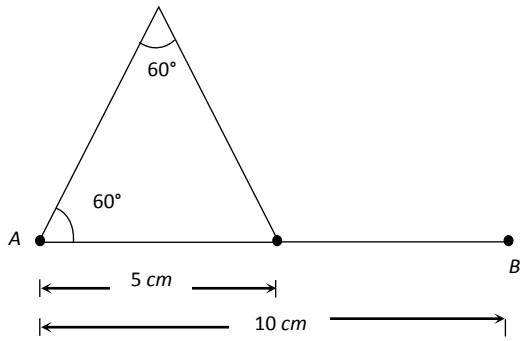
    a) $P_1 + P_2$

    b) $\sqrt{P_1 P_2}$

    c) $P_1 P_2/(P_1 + P_2)$

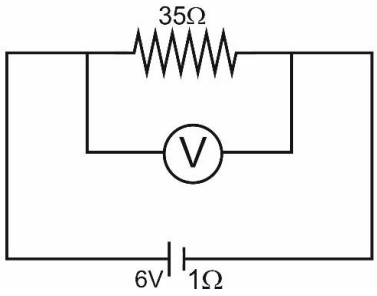
    d) $(P_1 + P_2)/P_1 P_2$

17. A wire has resistance of 24 Ω is bent in the following shape. The effective resistance between *A* and *B* is



(a) 24 Ω
(b) 10 Ω
(c) $\frac{16}{3}\Omega$
(d) None of these

18. A battery of 6V with internal resistance of 1Ω is connected to an external resistance of $35\ \Omega$ as shown in the figure. The reading in the voltmeter is



a) $\frac{6}{35}\ V$

b) $\frac{35}{6}\ V$

c) 6 V

d) 216 V

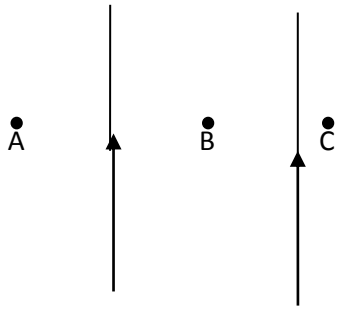
19. Two statements are given in each case – one related to Asserting (A) and the other labeled as Reasoning (R). Select the correct option from the four codes (a), (b), (c),(d)

Assertion (A) : A uniform magnetic field is acting in a direction from left to right on planes parallel to the horizontal page of this paper. If an electron enters this field at right angle in a top to bottom direction with a uniform velocity; it will experience a force which would be directed out of the page.

Reason (R) : The direction of the force is perpendicular to the direction of magnetic field as well as the current direction according to Fleming's left Hand Rule.

a) Both A and R are true and R is the correct explanation of the assertion.
b) Both A and R are true but R is not the correct explanation of the assertion
c) A is true but R is false
d) A is false but R is true

20. Two long straight parallel conductors carrying equal current are placed as shown in the figure. B is the midpoint between the two conductors and positions A and C are as shown in the figure. Which of the following statements is correct?



a) Magnetic field at A is equal to the magnetic field at C.
b) Direction of magnetic field at B is inward.
c) Direction of magnetic field at B is outward.
d) Magnetic field at B is zero.

CHEMISTRY QUESTION

1. A hydrated salt of Na_2SO_3 loses 22.22% of its mass on strong heating. The hydrated salt is :
   a) $Na_2SO_3.\ 4H_2O$
   b) $Na_2SO_3.6H_2O$
   c) $Na_2SO_3.H_2O$
   d) $Na_2SO_3.2H_2O$
2. Which of the following represents 32 gram of substance ?
   a) 1 mole of oxygen molecule
   b) 1 gram atom of sulphur
   c) 22.4L of oxygen gas at STP
   d) All of these
3. The ion that is iso-electronic with carbon monoxide is :
   a) O_2^-
   b) N_2^+
   c) CN^-
   d) O_2^+
4. Assertion (A) : In Rutherford's gold foil experiment very few alpha particles are deflected back.
   Reason (R) : Nucleus present inside the atom is positively charged.
   Mark the correct choices as:
   a) Both the assertion (A) and reason(R) are true and reason (R) is the correct explanation of assertion (A).
   b) Both assertion (A) and reason(R) are true but reason(R) is not the correct explanation of assertion (A).
   c) Assertion (A) is true but reason(R) is false.
   d) Assertion (A) is false but reason(R) is true.
5. The density of water at room temperature is $1.0 gmL^{-1}$. How many molecules are there in a drop of water if its volume is 0.05ml ?
   a) 2.4×10^{22}
   b) 1.68×10^{21}
   c) 6.02×10^{21}
   d) 3.9×10^{20}

6. Assertion (A): $4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$ is an example of disproportionation reaction.
   Reason (R): In a disproportionation reaction an element in one oxidation state is simultaneously oxidized and reduced.
   Mark the correct choices as:

   a) Both the assertion (A) and reason(R) are true and reason (R) is the correct explanation of assertion (A).
   b) Both assertion (A) and reason(R) are true but reason(R) is not the correct explanation of assertion (A).
   c) Assertion (A) is true but reason(R) is false.
   d) Assertion (A) is false but reason(R) is true.

7. A white solid (A) on thermal decomposition produces a yellow solid (B), a brown gas (C) along with oxygen. The correct chemical equation for the above reaction is :

   a) $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 2N_2 + 5O_2$
   b) $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO + 3O_2$
   c) $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2 + O_2$
   d) $Pb(NO_3)_2 \xrightarrow{\Delta} PbO + N_2O + 2O_2$

8. The products formed by the following reaction are :
   $NaCl + H_2O + CO_2 + NH_3 \rightarrow$

   a) $NH_4HCO_3,\ NaCl$
   b) $(NH_4)_2CO_3,\ NaCl$
   c) $NH_4Cl,\ NaHCO_3$
   d) $NH_4Cl,\ Na_2CO_3$

9. A gas ‘X’ is obtained by the action of dilute acid on washing soda. When the gas ‘X’ is passed through lime water, it turns milky and on passing excess the gas, the milkiness disappears. The correct reactions showing the formation of gas ‘X’ and formation of milky compound respectively are:

   a) $2NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + CO_2 + H_2O$

      $CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$

   b) $Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$

      $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

   c) $Na_2SO_3 + 2HCl \rightarrow 2NaCl + H_2O + SO_2$

      $Ca(OH)_2 + SO_2 \rightarrow CaSO_3 + H_2O$

   d) All of the above

10. Between H_3PO_4 and H_3PO_3 , which of the following statement is correct ?

   a) H_3PO_3 is a reducing agent and dibasic in nature.

   b) H_3PO_4 is a reducing agent and dibasic in nature.

   c) H_3PO_4 is a reducing agent and tribasic in nature.

   d) H_3PO_3 is neither a reducing agent nor dibasic in nature.

11. A metal ‘X’ when exposed to moist air containing CO_2 produced a green coating ‘Y’ ‘X’ and ‘Y’ are :

   a) Cu and $CuO.Cu(OH)_2$

   b) Zn and $ZnCO_3.Zn(OH)_2$

   c) Cu and $CuCO_3.Cu(OH)_2$

   d) Zn and $ZnO.Zn(OH)_2$

12. Four metals A, B, C and D are in turn, added to the following solutions one by one and the observations made are tabulated below

Metals	$FeSO_{4(aq)}$	$CuSO_{4(aq)}$	$Al_2(SO_4)_{3(aq)}$	$AgNO_{3(aq)}$
A	No reaction	Displacement	No reaction	Displacement
B	Displacement	Displacement	No reaction	Displacement
C	Displacement	Displacement	Displacement	Displacement
D	No reaction	No reaction	No reaction	No reaction

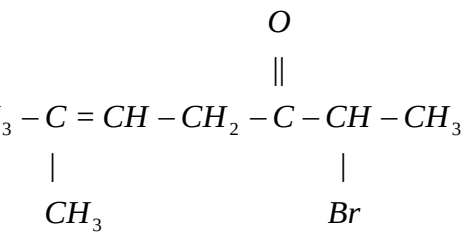
The correct order of reactivity of the metals A, B, C and D is

a) C > A > B > D

b) D > A > B > C

c) D > B > A > C

d) C > B > A > D

13. The name of 

according to IUPAC nomenclature system is:

a) 6-Bromo-2-methylhept-2-en-5-one

b) 2-Bromo-6-methylhept-5-en-3-al

c) 2-Bromo-6-methylhept-5-en-3-one

d) 6-Methyl-2-bromohept-5-en-3-one

14. Propanol and methoxyethane both are:

a) Position isomers

b) Chain isomers

c) Metamers

d) Functional isomers

15. Assertion (A) : Carbon shows catenation to large extent than that of silicon though both the elements belong to the same group of modern periodic table.

Reason (R) : C-C bond is stronger than Si-Si bond.

Mark the correct choices as:

a) Both the assertion (A) and reason(R) are true and reason (R) is the correct explanation of assertion (A).

b) Both assertion (A) and reason(R) are true but reason(R) is not the correct explanation of assertion (A).

c) Assertion (A) is true but reason(R) is false.

d) Assertion (A) is false but reason(R) is true.

16. The number of covalent bonds present in first member of the homologous series of ketone is :

a) 4

b) 7

c) 9

d) 10

17. Which of the following has highest metallic character?

Element	Ionisation energy (eV)
P	16.2
Q	1.5
R	12.2
S	10.5

a) S

b) Q

c) R

d) P

18. The element with atomic number 64 belongs to which group and period of the modern periodic table?

a) group - 3, period - 6

b) group - 2, period - 6

c) group - 13, period - 6

d) group - 14, period – 6

19. Identify the correct increasing order of atomic radii of B, AI & Ga.

a) B < Al < Ga

b) B < Ga < Al

c) Al < B < Ga

d) Ga < Al < B

20. The process requiring the absorption of energy is :

a) $F \rightarrow F^-$

b) $Cl \rightarrow Cl^-$

c) $O \rightarrow O^-$

d) $O \rightarrow O^{2-}$

BIOLOGY QUESTION

1.Double fertilization is a unique process that takes place in angiosperms. The process is initiated with compatible pollen-pistil interaction. It is of great significance with regard to formation and development of embryo. It involves

(a) fertilization of egg cell by two male gametes.

(b) fertilization of egg cell and a central cell by two male gametes brought by same pollen tube.

(c) fertilization of egg cell and a central cell by single male gamete brought by the pollen tube.

(d) fertilization of egg cell and a central cell by two male gametes brought by different pollen tubes.

2. Oogenesis is a hormone regulated process that takes place in the female reproductive system. In mammals it may take several months and years for completion. The last stage of the process is maturation of secondary oocyte which is completed

(a) shortly after ovulation but before the secondary oocyte makes entry into the fallopian tube.

(b) just after the secondary oocyte has been penetrated by the sperm.

(c) after the nucleus of the sperm has fused with that of the ovum.

(d) in the graafian follicle following the first maturation division.

3. Plant tissue culture is a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition. To obtain virus free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken?

(a) Apical meristem only

(b)Palisade parenchyma

(c)Both apical and axillary meristems

(d)Epidermis only

4.In a plant species, flower colour yellow is dominant over white and fruit shape round is dominant over elongated. Crossing over was performed between two pure lines, *i.e.* one having yellow flower and round fruit and another with white flower and elongated fruit. About 20 plants survived in F_1 progeny. Plants of F_1 were allowed for self fertilization and about 960 plants survived in F_2. If the traits follow Mendelian inheritance, the number of plants that would have yellow flower and round fruit in F_1 and F_2 respectively will be

(a)10, 180

(b)20, 540

(c)20, 60

(d) 20, 180

5.A homozygous tall plant was grown in nutrient deficient soil and remained dwarf. When it is crossed a with dwarf plant and the seeds grown under normal conditions, then

(a) all hybrid plants are dwarf

(b) all hybrid plants are tall

(c)50% tall and 50% dwarf

(d)75% tall and 25% dwarf

6.Assertion(A): In humans the type of male gamete that fuses with the egg determines whether the child will be male or female.

Reason(R): Male produces heterogametes whereas female produces homo-gametes in all animals.

A. Both assertion and reason are true and reason is the correct explanation of Assertion
B. Both assertion and reason are true and reason is not the correct explanation of assertion.
C. Assertion is true but reason is false.
D. Assertion is false but reason is true

7. Consider the following statements concerning food chains and food web:

I. Removal of 90% tigers from an area resulted in greatly increased growth of vegetation.
II. In a food web the same organism may be found at different trophic levels.
III. The length of food chains is generally limited to 3-4 trophic levels due to energy loss.
IV. The organism at the last trophic level of the food chain receives the maximum amount of energy.

Which of the above statements are correct?

(a)III only

(b)II and III

(c)I, II and IV

(d)I and II

8.Assertion(A): UV radiation causes photo dissociation of ozone into O_2 and O, thus causing damage to the stratospheric ozone layer.

Reason(R): UV-B is responsible for causing mutations leading to various types of cancer.

A. Both assertion and reason are true and reason is the correct explanation of Assertion
B. Both assertion and reason are true and reason is not the correct explanation of assertion.
C. Assertion is true but reason is false.
D. Assertion is false but reason is true

9.Nephrons are the structural and functional unit of kidney involved in the process of excretion and osmoregulation. If Henle's loop were absent from mammalian nephron, which of the following to be expected?
(a)The urine will be more concentrated
(b)The urine will be more dilute
(c)There will be no urine formation
(d)There will be hardly any change in the quality and quantity of urine formed.

10.Due to some injury the chordae tendineae of mitral valve in human heart became partially non-functional. What would be its effect on blood circulation?
(a)The flow of blood into pulmonary artery will be reduced.
(b) The blood will tend to backflow into left atrium.
(c) The blood will tend to backflow into right atrium.
(d)There will be more flow of blood into the aorta.
11.Assertion(A): The inner membrane of mitochondrion is highly folded forming finger like projections called cristae.

Reason(R): The inner membrane is less permeable in comparison to the outer mitochondrial membrane.

A. Both assertion and reason are true and reason is the correct explanation of Assertion
B. Both assertion and reason are true and reason is not the correct explanation of assertion.
C. Assertion is true but reason is false.
D. Assertion is false but reason is true
12. The RER in the cell synthesises proteins which would be later used in building the plasma membrane. But it is observed that the protein in the membrane is slightly different from the protein made in the RER. Identify the organelle in which the protein was probably modified.
a. Nucleus
b. Mitochondria
c. Golgi bodies
d. Lysosome
13. Chloroplast contains pigments such as chlorophylls, xanthophylls, carotenoids for absorption of sunlight. Both grana and stroma are equally important for the process of photosynthesis. Choose the location of Chlorophyll pigments in chloroplast.
a. In outer membrane
b. In Stroma
c. In grana and stroma
d. In thylakoid
14. Epithelial cells are found covering the body and visceral organs with necessary modifications. Somewhere these are cuboidal, somewhere columnar and these may or may not be provided with cilia. The type of epithelial cells forming the linings of kidney tubules and ducts of salivary glands are
a. ciliated columnar epithelium
b. cuboidal epithelium
c. squamous epithelium
d. stratified epithelium

15. A plant cell having a cellulosic wall, a thin lining of cytoplasm, enucleated but still living. It is a part of complex permanent tissue. The cell is
a. tracheid
b. companion cell
c. sieve tube cell
d. vessels
16. Pathogens have a target site for multiplication in host body. The bacteria causing peptic ulcer having the symptoms of acidity related pain and bleeding in stomach and intestine is under control by antibiotics and the disease is no longer a chronic disease. The microorganism that causes peptic ulcer is
a. *Treponema palladium*
b.*Trypanosoma gambiensie*
c.*Helicobacter pylori*
d.*Mycobaterium*
17. Pathogens have a specific target site for multiplication in the host body. The life cycle of malarial parasite is complex and it has more than one host. Which of the following sites you will look for sporozoites, the infective stage of malarial parasite?
a. Pancreas of human being
b. Salivary glands of freshly moulted female *Anopheles* mosquito
c. Salivary glands of infected female *Anopheles* mosquito
d. Red blood corpuscles of humans suffering from sickle cell anaemia
18. Innate immunity is maintained by physical, cellular, physiological and inflammatory barriers. Saliva acts as a physiological barriers of immune system and prevents the entry of pathogens in our body as it contains
a. Lysozyme
b. Amylase
c. Peptidase
d. zymase

19. Digestion of food stuffs is mediated by both mechanical and chemical processes. Enzymes are the biocatalysts, accelerating the chemical reactions of our body. If for some reason the parietal cells of the gut epithelium become partially non-functional, what is likely to happen?
a. pH of the stomach will fall abruptly.
b. Pepsin will be more effective
c. Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones.
d. The pancreatic enzymes and specially trypsin and lipase will not work efficiently.
20. During which stage in the complete oxidation of glucose highest number of ATP molecules are formed from ADP?
a. Conversion of pyruvic acid to acetyl Co-A.
b. Glycolysis
c. Electron transport chain
d. Krebs cycle

MATHEMATICS

1. Find the number of integral solutions of $xy = 2^2 3^4 5^7 (x + y)$
   a) 775
   b) 675
   c) 125
   d) 575
2. For a real number x < -1 which of the following is true?
   a) $x < x^2 < x^3$
   b) $x < x^3 < x^2$
   c) $x^2 < x^3 < x$
   d) $x^3 < x < x^2$
3. If $x = 2 + \sqrt{3}$ and $y = 2 - \sqrt{3}$, then the value of $\left(\frac{1}{x^3} + \frac{1}{y^3}\right)$ is
   a) 42
   b) 48
   c) 50
   d) 52
4. A certain number when divided by 222 leaves a remainder 35, another number when divided by 407 leaves a remainder 47. What will be the remainder when some of these two numbers is divided by 37
   a) 6
   b) 7
   c) 8
   d) 9
5. Let p(x) be a polynomial of degree 3 and $p(n) = \frac{1}{n}$ for n=1,2,3,4. Then the value of p(5) is

   (a) 0
   (b) $\frac{1}{5}$
   (c) $\frac{-2}{5}$
   (d) $\frac{3}{5}$
6. Number of real roots satisfying the equation $\sqrt{2x + 7} + \sqrt{x + 4} = 0$
   (a) 2
   (b) 1
   (c) 0
   (d) More than 2
7. Let p and q are distinct prime numbers, then number of positive integral solutions of the equation $\frac{1}{x} + \frac{1}{y} = \frac{1}{pq}$ is

   a) 6
   b) 7
   c) 8
   d) 9

8. Pick out the correct option with regard to the following statements.

   I. The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have no solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

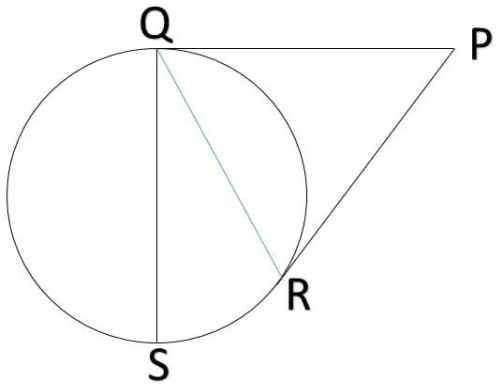
   II. The pair of linear equation $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinite solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

   a) I is true but II is false
   b) I is false but II is true
   c) Both I and II are true
   d) Both I and II are false

9. A man row downstream at 12 km /hr and upstream at 8km/hr. Then the speed of the man in still water is
   a) 12 km/hr
   b) 10 km/hr
   c) 8 km/hr
   d) 4 km/hr

10. The length of each side of a ΔABC are in integral units. If the length of side AB=10units, length of side BC=15 units, then the number of distinct possible value of length of side AC is
   a) 13
   b) 19
   c) 21
   d) 25

11. In the given figure, PQ and PR are tangents to the circle. QS is the diameter of the circle. Then which one of the following is correct?



   a) $\angle QPR = \frac{1}{2}\angle RQS$
   b) $\angle QPR = \angle RQS$
   c) $\angle QPR = 2\angle RQS$
   d) None of these

12. The diagonals $\overline{AC}$ and $\overline{BD}$ of a cyclic quadrilateral ABCD intersect each other at right angle in E. Let R be the circumradius of the ABCD and $EA^2+EB^2+EC^2+ED^2=nR^2$ then the value of n is
    a) 1
    b) 2
    c) 3
    d) 4
13. Two circles with centres A and B have radii 8cm and 1cm respectively. The length of the line AB is 13cm. A third circle with centre 'C' and radius 'r' cm touches both circles externally. If $\angle ACB=90^0$, then value of 'r' is
    a) 11
    b) 9
    c) 7
    d) 4
14. If three circles of radius 1 unit each are inscribed in an equilateral triangle, then the area of the triangle is
    a) $\left(6+4\sqrt{3}\right) sq.units$
    b) $\left(8+\sqrt{3}\right) sq.units$
    c) $\left(6+\sqrt{3}\right) sq.units$
    d) $4\left(1+\sqrt{3}\right) sq.units$

15. If $sinx+sin^2x=1$, then which one the following is true ?
    a) $cosx+cos^2x=1$
    b) $cosx-cos^2x=1$
    c) $cos^2x+cos^4x=1$
    d) $cos^4x+cos^3x=1$
16. The shadow of a tower standing on the ground level is found to be 60 metres longer when the Sun's attitude is 30^0 than when it is 45^0. Then height of the tower is
    a) 60 metres
    b) 30 metres
    c) $30\left(\sqrt{3}+1\right)$metres
    d) $60\left(\sqrt{3}-1\right)$ metres

17. If x, y, z are natural numbers satisfy $x^{y^z}.y^{z^x}.z^{x^y}=5xyz$ then the value of x+y+z is
    a) 1
    b) 2
    c) 5
    d) 8
18. Let XOY be a triangle with $m\angle XOY=90^0$ let M and N be the midpoints of Legs $\overline{OX}$ and $\overline{OY}$ respectively with XN=19cm, YM=22cm then Length of XY is
    a) 23cm
    b) 24cm
    c) 25cm
    d) 26cm

19. Let N₁=2⁵⁵+1 and N₂=165 Then
    a) N_1 and N_2 are co prime
    b) The HCF (Highest common factor) of N_1 and N_2 is 55
    c) The HCF of N_1 and N_2 is 11
    d) The HCF of N_1 and N_2 is 33
20. The value of $\frac{sin^6\theta - cos^6\theta}{sin^2\theta - cos^2\theta}$ is equal to
    a) $sin^4\theta - cos^4\theta$
    b) $sin^3\theta - cos^3\theta$
    c) $1 - sin^2\theta.cos^2\theta$
    d) $1 - 3sin^2\theta.cos^2\theta$
21. If α *and* β are the roots of the equation $3x^2 - 5x + 3 = 0$, then the quadratic equation whose roots are $\alpha^2\beta$ and $\alpha\beta^2$ is

    a) $3x^2 - 5x + 3 = 0$
    b) $3x^2 - 8x + 5 = 0$
    c) $3x^2 - 8x + 3 = 0$
    d) $3x^2 - 5x - 3 = 0$
22. The water level in a cylindrical container of radius $\frac{1}{2}m$ is 3.2 m. When a spherical solid object is completely submerged in the water, the water level rises by 0.6m. Then the volume (in m^3) of the sphere is
    a) $\frac{11}{35}$
    b) $\frac{11}{70}$
    c) $\frac{33}{70}$
    d) None of these
23. Let $x_1, x_2 \ldots x_{11}$ be 11 distinct positive integers. If we replace the largest of these integers by the median of the other 10 integers, then
    a) the median remains the same
    b) the mean increases
    c) the median decreases
    d) the mean remains the same
24. If $0 < \alpha < \beta < \gamma < 90^0$ then $\frac{sin\alpha + sin\beta + sin\gamma}{cos\alpha + cos\beta + cos\gamma}$ lies between
    a) $cos\alpha$ *and* $cos\gamma$
    b) $sin\,\alpha$ *and* $sin\gamma$
    c) $tan\,\alpha$ *and* $tan\gamma$
    d) $cot\alpha$ *and* $cot\gamma$

25. The 10^{th} term from the end of the AP 5, 12,19,….,173 is
    a) 117
    b) 103
    c) 110
    d) 96

26. Using 1,2,3,4,5 five digit numbers are formed. The probability that the number is divisible by 3 is
    a) $\frac{1}{2}$
    b) $\frac{1}{3}$
    c) 1
    d) $\frac{2}{3}$

27. If the rank of 10 students A_1, A_2…., A_{10} is displayed with a condition that no two student will get the same rank, then what is the probability that the student A_1 will always secure better rank than A_2
    a) $\frac{1}{4}$
    b) $\frac{1}{2}$
    c) $\frac{1}{3}$
    d) $\frac{2}{3}$

28. A shoe company, making shoes for adults only, wants to know the most popular size of shoes. Which measure of central tendency will be most suitable for it?
    a) Mean
    b) Median
    c) Mode
    d) Mean and Median

29. If the 9^{th} term of an Arithmetic progression (AP) is 499 and 499^{th} term is 9, then which term of the AP is zero ?
    a) 509^{th}
    b) 508^{th}
    c) 507^{th}
    d) 506^{th}

30. Two right circular cones having the same base radius of 2cm , but heights 3cm and 5cm are melted and recasted into a single sphere. Then the surface area of the sphere in cm^2 is
    a) 32π
    b) 20π
    c) 16π
    d) 10π

31. The radius ‘r’ of a cylinder is made twice as large by keeping the volume same as before. If ‘h’ is the height of the original cylinder and ‘H’ is the height of the new cylinder , then which of the following condition is true ?
    a) $H = \frac{1}{4}h$
    b) $H \geq h$
    c) $h = \frac{1}{4}H$
    d) $H = 2h$

32. There are two temples, one on each bank of a river, just opposite to each other. One temple is 54m high. From the top of this temple, the angles of depression of the top and the foot of the other temple are 30^0 and 60^0 respectively. Then the height of the other temple is
    a) 54m
    b) 46m
    c) 36m
    d) 18m
33. If A, B,C,D are the angles of a cyclic quadrilateral ABCD, then the value of cosA+cosB+cosC+cosD is
    a) $\frac{-1}{\sqrt{2}}$
    b) $\frac{1}{2}$
    c) $\frac{\sqrt{3}}{2}$
    d) 0
34. In a triangle ABC if $tan\frac{A}{2} = \frac{5}{6}$ and $tan\frac{C}{2} = \frac{2}{5}$ then
    a) a, c, b are in AP
    b) a, b,c are in AP
    c) b,a,c are in AP
    d) None of these
35. In the following figure, if the area of the rectangle is 80 unit^2, then the area of the kite is
    a) 30 unit^2
    b) 40 unit^2
    c) 50 unit^2
    d) 60 unit^2

36. Consider the following statements for any convex quadrilateral
    I. The line segments joining the midpoints of the two pairs of opposite sides, bisect each other at the point of intersection.
    II. The area of the quadrilateral formed by joining the midpoints of the adjacent sides is half of the total of the original quadrilateral.

    Which of the following statement (s) is /are true?

    a) I only
    b) II only
    c) Both I and II
    d) Neither I and II
37. If $tan^2\theta = 1 - a^2$, then $sec\theta + tan^3\theta\ .cosec\theta$ is equal to
    a) $\sqrt{2-a^2}$
    b) $(2-a^2)^{3/2}$
    c) $2-a^2$
    d) None of these

38. If $0^0 < \theta < 90^0$, and $2cos\theta + 2\sqrt{2} = 3sec\theta$, then the value of θ is

a) 30^0
b) 60^0
c) 45^0
d) None of these

39. The percentage increase in the area of a triangle, if its each side is doubled is

a) 200%
b) 50%
c) 300%
d) 400%

40. If $p(x) = ax^3 + 4x^2 + 3x - 4$ and $q(x) = x^3 - 4x + a$ have the same remainder when divided by (x-3), then the value of a is

a) -1
b) 0
c) 1
d) None of these