NATIONAL TALENT SEARCH EXAMINATION (NTSE-2017) STAGE -1
MAHARASHTRA STATE : SAT

Date: 06/11/2016

Max. Marks: 100 **Time allowed: 90 mins**

SOLUTIONS

1. The work done in moving 10 lithium nuclei (Atomic number of Li = 3) through a potential difference of 10 V is (Charge on an electron is 1.6×10^{-19}C)

(1) 4.8×10^{-16} J (2) 4.8×10^{-19} J (3) 4.8×10^{-18} J (4) 4.8×10^{-17} J

Ans. (4)

Sol. 10 atom of Li

$\therefore$ Total charge $q = 3 \times 1.6 \times 10^{-19} \times 10$

$Q = 4.8 \times 10^{-18}$

$V = 10V$

$W = V \times Q$

$= 10 \times 4.8 \times 10^{-18}$

$W = 4.8 \times 10^{-17}$ J

2. Choose the correct alternative which matches second and third column with first column:

Column I	Column II	Column III
(I) Magnetic field is produced near current carrying conductor	(A) Right hand thumb rule	(a) Micheal Faraday
(II) Electric current is generated in a conductor moving in a magnetic field	(B) Fleming's right hand rule	(b) Hans Oersted

(1) (I) - (B) - (a), (II) - (B) - (b) (2) (I) - (A) - (b), (II) - (B) - (b)

(3) (I) - (B) - (b), (II) - (A) - (a) (4) (I) - (A) - (b), (II) - (B) - (a)

Ans. (4)

Sol. Magnetic field around conductor is given by Right hand thumb rule and it is associated with oersted while generation of current is given by Fleming's right hand rule and stated by Michael Faraday.

3. M.R.I. is based on _____

(1) Magnetic effect of electric current (2) Heating effect of electric current

(3) Chemical effect of electric current (4) Conduction of electric current

Ans. (1)

Sol. MRI uses the technique of magnetic effect of electric current.

4. For refraction of light from air to rock salt, water and diamond if:

V - Velocity of light in air

V_1 - Velocity of light in rock salt

V_2 - Velocity of light in water

V_3 - Velocity of light in diamond, then

Choose the correct alternative

(1) $V_3 > V_1 > V_2 > V$ (2) $V > V_2 > V_1 > V_3$ (3) $V > V_1 > V_2 > V_3$ (4) $V_1 > V > V_3 > V_2$

Ans. (2)

Sol. n_a for air = 1

n_w for water = 1.3

n_r for rock salt = 1.5

n_d for diamond = 2.4

$$n_a < n_w < n_r < n_d \text{ as } n \propto \frac{1}{V}$$

$\therefore\ V_a > V_w > V_r > V_d$

i.e. $V_1 > V_2 > V_1 > V_3$

5. When white light is passed through an upside down (inverted) prism then _____.

(1) White light is obtained

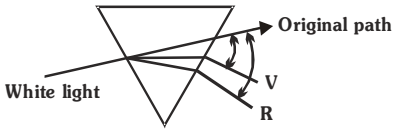
(2) Spectrum is obtained with violet colour undergoing maximum deviation and red colour undergoing minimum deviation

(3) Spectrum is obtained with red colour undergoing maximum deviation and violet colour undergoing minimum deviation.

(4) light gets blocked

Ans. (3)

Sol. Here violet undergoes minimum deviation and red undergoes maximum deviation.



6. Select the correct sequence of light entering the different parts of human eye

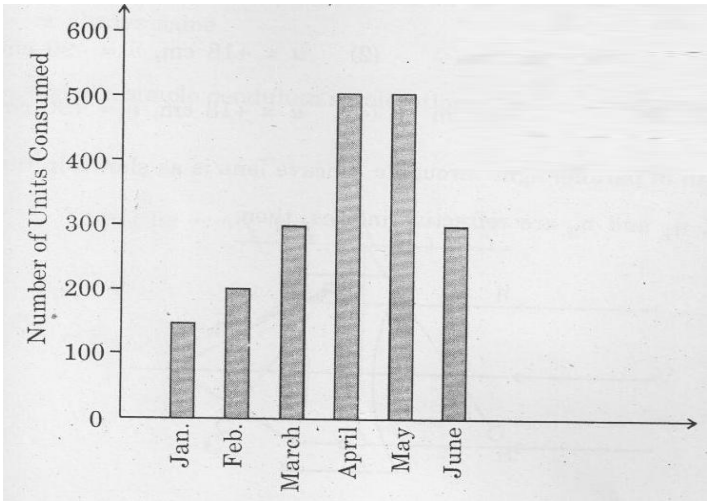
(1) cornea, lens, iris, pupil, retina (2) pupil, cornea, iris, lens, retina

(3) cornea, pupil, iris, lens, retina (4) cornea, iris, pupil, lens, retina

Ans. (4)

Sol. Light enter the eye in following sequence cornea iris, pupil lens and retina.

7. Graph shows the number of units consumed by a family for six months. Find the cost of energy for four months from March to June if M.S.E.B. increased its unit rate from ₹3.50 to ₹4.50 for April and May and again decreased by ₹2 for June:



(1) ₹ 6,000 (2) ₹6,030 (3) ₹6,300 (4) ₹ 6,200

Ans. (3)

Sol.

Month	No. of units	Cost per unit	Total cost per month
January	150	3.50	525
February	200	3.50	700
March	300	3.50	1050
April	500	4.50	2250
May	500	4.50	2250
June	300	2.50	750

Total cost for March, April, May and June = 1050 + 2250 + 2250 + 750 = 6300

8. Object placed _____of lens or mirror give infinite magnification

(1) at focus (2) at infinite distance (3) between F_1 & $2F_1$ (4) at $2F_1$

Ans. (1)

Sol. Whenever an object placed at focus highly magnified image is formed, at infinity

9. If a 3 cm tall object placed perpendicular to principal axis of a convex lens of focal length 15cm produces a real inverted image of height 15cm, then its object distance (u) is _____ and image distance (v) is ____

(1) u = -18m, v = +90 m (2) u = +18 cm, v = -90 cm

(3) u = -18cm, v = +90 cm (4) y = +18 cm, v = +90 cm

Ans. (3)

Sol. $h_1 = 3cm$

$h_2 = 15cm$

$$m = \frac{h_2}{h_1} = \frac{15}{3} = 5$$

As image is real and inverted

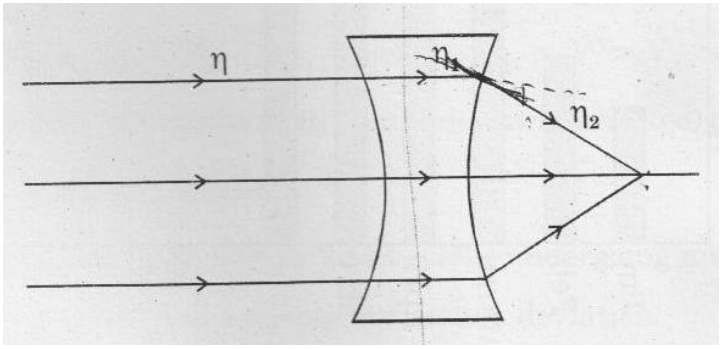
$m = -5$

object distance is alway negative

$\therefore$ $u = -18cm$

and $v = +90$ cm

10. If the path of parallel light through a concave lens is as shown in the figure, where η, η_1 and η_2 are refractive indices, then _____



(1) $\eta > \eta_1 = \eta_2$ (2) $\eta = \eta_1 < \eta_2$ (3) $\eta = \eta_1 > \eta_2$ (4) $\eta < \eta_1 = \eta_2$

Ans. (3)

Sol. As ray passed undeviated hence

$n = n_1$

From n_1 to n_2 light bends, hence n_1 is denser compared n_2.

$\therefore \quad n = n_1 > n_2$

11. Distance covered by an object thrown upwards in the last second _____

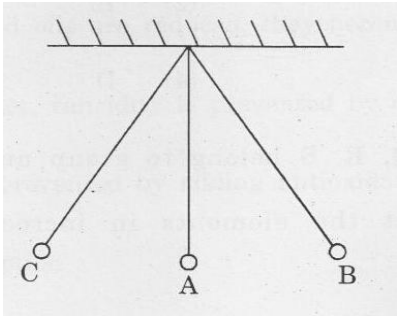
(1) depends on initial velocity (2) depends on mass

(3) depends on air velocity (4) is always same

Ans. (4)

Sol. Distance travelled in last second is independent of initial velocity. Hence it always remains constant.

12. In motion of a simple pendulum acceleration and kinetic energy are maximum at _____.



(1) C, B, A (2) A, B, C (3) A only (4) B, C only

Ans. (3)

Sol. At point A object has maximum velocity. Hence K.E. is maximum.

13. A washing machine rated 300 W is operated one and half an hour/day. If the cost of units is ₹3.50, find the cost of energy to operate a washing machine for the month of September.

(1) ₹27.90 (2) ₹35.25 (3) ₹47.25 (4) ₹55.90

Ans. (3)

Sol. P = 300 W = 0.3 kW

t = 1.5 hr

cost = 3.50

September = 30 days

Total cost = $0.3 \times 1.5 \times 3.50 \times 30$

= 47.25 rs.

14. Elements A, B, C, D have atomic numbers as 35, 19, 17, 9 respectively. Choose the odd element.

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

Ans. (2)

Sol. Electronic configuration of following elements:

$_{35}A \rightarrow 2, 8, 18, 7$

$_{19}B \rightarrow 2, 8, 8, 1$

$_{17}C \rightarrow 2, 8, 7$

$_{9}D \rightarrow 2, 7$

As seen above electronic configuration of element B has one election in its outermost shell and other elements has seven elections in outermost shell.

So element B is metal

element A, C, D are non-metals (Halogen)

15. The elements P, Q, R, S belong to group number 14, 15, 16, 17 respectively. Select the elements in increasing order of their electronegativity.

(1) P < Q < R < S (2) P > Q > R > S (3) R < Q < P < S (4) Q < P < S < R

Ans. (1)

Sol. As we move from left to right in periodic table electronegativity of element increase.

16. For the following reaction which statement is true?

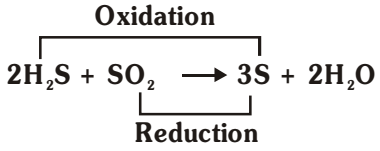
$2H_2S(g) + SO_2(g) \rightarrow 3S(s) + 2H_2O(I)$

(a) H_2S is reduced (b) SO_2 is oxidised (c) H_2S is reducing agent (d) SO_2 is oxidising agent

(1) (a) and (c) (2) (b) and (c) (3) (a) and (b) (4) (c) and (d)

Ans. (4)

Sol.



As this is Disproportionation reaction. There is loss of hydrogen from H_2S and loss of oxygen from SO_2.

H_2 S is reducing agent

$SO_2$is oxidising agent

17. A Science teacher wrote 3 statements about rancidity

(i) When fats and oils are reduced, they become rancid

(ii) In chips packet, rancidity is prevented by oxygen

(iii) Rancidity is prevented by adding antioxidants

Select the correct option

(1) (i) (2) (ii) and (iii) (3) (iii) (4) (i), (ii) and (iii)

Ans. (3)

Sol. The oils and fats are slowly oxidised to certain bad smelling compounds, which release foul smell. This is known as Rancidity.

Preventation of Rancidity:

(1) By adding anti-oxidants.

(2) In chips packet, it is prevented by Nitrogen.

18. The gas evolved during the reaction of $CuCl_2$ and conc. H_2SO_4 is _____

(1) Neutral (2) Basic (3) Highly basic (4) Acidic

Ans. (4)

Sol. $CuCl_2$ + conc. $H_2SO_4 \longrightarrow CuSO_4 + 2\ HCl\uparrow$

The gas formed is HCl which is acidic in nature.

19. Which of the following substances has the lowest pH-value ?

(1) Tomato juice (2) Vinegar (3) Washing soda (4) Human blood

Ans. (2)

Sol.

Substances	P_H value
Vinegar	3
Tomato Juice	4.1
Human blood	7.36
Washing Soda	9

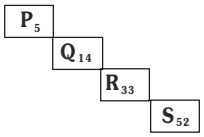
20. Which of the following is most reactive metal?

(1) Fe (2) Zn (3) Ca (4) Al

Ans. (3)

Sol. As calcium is placed lies in the reactivity series, it is most reactive.

21. In the given square, P, Q, R, S with atomic number is written are metalloids. About this the 4 statements are given below. Select the correct option of the true statements:



(a) Element after square P is a non-metal (b) Square R represents metalloid

(c) Element just before square R is a metalloid (d) Element just before square S is a non-metal

(1) (a), (b) and (c) (2) (a), (b) and (d) (3) (b) and (c) (4) (a), (b), (c) and (d)

Ans. (3)

Sol. As P, Q, R and S are metalloid.

22. In the following structural formulae one IUPAC name is incorrect. Identify it

(1) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_3$ — **Butanone**

(2) $CH_3-CH_2-\overset{\overset{H}{|}}{C}=O$ — **Propanal**

(3) $CH_3-CH_2-\overset{\overset{H}{\|}}{C}-OH$ — **Ethanoic acid**

(4) CH_3 - CH_2 - CH_2 - CH_2 - OH - Butanol

Ans. (3)

Sol.

$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-OH$$

As it contains three carbon atoms and carboxylic acid (- COOH) as functional group. So its IUPAC name is Propanoic Acid.

23. Select a compound which gives effervescence with $NaH.CO_3$ solution.

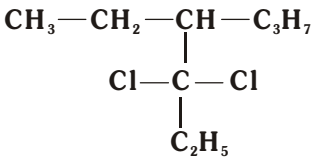
(1) C_2H_6O (2) $C_2H_4O_2$ (3) C_2H_4O (4) $C_3H_8O_2$

Ans. (2)

Sol. When Ethanoic acid reacts with sodium hydrogen carbonate it froms sodium ethanote, water and carbon dioxide gas is evolved.

$$NaHCO_3 + CH_3COOH \longrightarrow CH_3COONa + H_2O + CO_2$$

24. What is the IUPAC name of the following compounds?

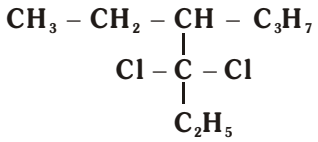


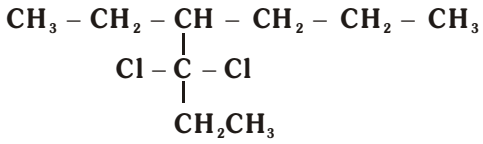
(1) 4-Ethyl-3, 3-dichloro heptane (2) 4-Ethyl-3, 3-dichloro hexane

(3) 4-Ethyl-3-chlorohexane (4) 3, 3-dichloro-4-butyl heptane

Ans. (1)

Sol.





3, 3-Dichloro - 4 - ethyl heptane

But in the above option most suitable answer is option (1) i.e.

4-Ethyl - 3, 3-dichloro heptane.

25. X and Y are the two atomic species:

	X	Y
Number of Proton	8	8
Number of Neutron	8	10

Select the correct statement about X and Y

(1) X and Y are isobars (2) X and Y have different chemical properties

(3) X and Y have different physical properties (4) X and Y are the atoms of different elements

Ans. (3)

Sol. ${}^{16}_{8}X$ ${}^{18}_{8}Y$

As X and Y has same atomic numbers but different mass numbers so they are

Isotopes

Isotopes have different physical properties.

26. How many electrons are present in M-shell of an element with Atomic number 20?

(1) 8 (2) 6 (3) 18 (4) 2

Ans. (1)

Sol. Electronic confrigation of element

	K	L	M	N
${}_{20}X \rightarrow$	2	8	8	2

27. Which of the following harmful products is not produced in the biochemical reactions of the cell of living organisms?

(1) Urea (2) Uric acid (3) Ammonia (4) Lymph

Ans. (4)

Sol. Lymph is the tissue fluid that circulates in lymphatic vessels. It is similar to blood but without red blood cells. It is not a metabolic harmful product.

28. Match the following components of Column 'A' with the components of Column 'B'

Column 'A'	Column 'B'
(1) Venus flytrap	(A) A trap which looks and smells like a flower to catch the insects.
(2) Balsam	(B) Flower opens in the morning
(3) Drosera	(C) Fruit bursts open to scatter the seeds
(4) Lotus	(D) Tentacles on the leaves to trap the insects.

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

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

Ans. (1)

Sol. Venus fly trap - trap which looks and smells like flower to catch insects.

Balsam - Fruit burst open to scatter the seed.

Drosera - Tentacles on leaves to trap insects.

Lotus - Flower that open in morning.

29. Select the correct sequence of the steps of human nutrition.

(1) Ingestion → Digestion → Absorption → Assimilation → Egestion

(2) Ingestion → Digestion → Assimilation → Absorption → Egestion

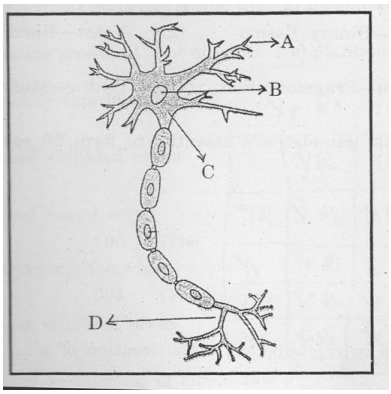
(3) Ingestion → Assimilation → Digestion → Absorption → Egestion

(4) Ingestion → Absorption → Digestion → Assimilation → Egestion

Ans. (1)

Sol. Food is first taken in that is ingested then converted to simple form i.e. digestion then it is absorbed by blood i.e. absorption then taken to cell for metabolic action i.e. assimilation and then undigested food is thrown out of body through anus that is Egestion.

30. Where the environmental information is picked in the neuron?



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

Ans. (1)

Sol. Dendrites are responsible for picking up information from environment.

31. Which plant hormone is found in greater concentration in fruits and seeds?

(1) Auxins (2) Gibberellins (3) Cytokinins (4) Abscisic acid

Ans. (3)

Sol. Cytokinins are found in greater proportion or concentration in fruits and seeds.

32. Identify the wrong pair from the following

(1) Euglena - Binary fission (2) Yeast - Budding

(3) Spirogyra - Fragmentation (4) Hydra-Multiple fission

Ans. (4)

Sol. Hydra reproduces by budding.

33. How many male gametes are essential to form 25 seeds in Angiosopermic plants?

(1) 25 (2) 50 (3) 75 (4) 100

Ans. (2)

Sol. Formation of 25 seeds require 50 pollen grains which are the male gametes.

34. A basic process in reproduction is the creation of a _____copy.

(1) RNA (2) DNA (3) Nucleus (4) Mitochondria

Ans. (2)

Sol. DNA replications or doubling of DNA is basic requirement of reproduction.

35. Identify a fish who breathes air through its lungs.

(1) Lungfish (2) Rohu (3) Dogfish (4) Sting Ray

Ans. (1)

Sol. Rohu, Dogfish and sting ray respire though gills.

36. A pea plant with yellow and round seeds (YYRR) is crossed with a pea plant having green and wrinkled (yyrr) seeds, then in F_2 generation of this dihybrid cross 320 plants are produced. Out of which 180 plants have same phenotypic characters. Identify this phenotype.

(1) Yellow and wrinkled seeds (2) Yellow and round seeds

(3) Green and round seeds (4) Green and wrinkled seeds

Ans. (2)

Sol. In normal cross we have the phenotypic ratio of 9 : 3 : 3 : 1 when offsprings are

9 - Yellow round.

3 - Green round

3 - Yellow wrinkled

1 - green wrinkled

Now in 320 offspring 180 offsprings have same phenotype

$16 \rightarrow 9$

$320 \rightarrow x$

$16x = 320 \times 9$

$$x = \frac{320 \times 9}{16} = 150$$

So 180 offsprings will have yellow round seeds.

37. Which gas emits on burning of rice straw?

(1) SO_2 (2) NH_3 (3) O_3 (4) H_2S

Ans. (1)

Sol. SO_2 is emitted when rice story is burned.

38. If biomedical waste not handled properly, then which disease is a potent source in human being?

(1) Cancer (2) Heart diseases (3) AIDS (4) Leprosy

Ans. (3)

Sol. If biomedical waste not handled properly, then AIDS would be a potent source in human beings. AIDS is a viral disease.

39. Which category lies in between the genus and order in the classification of plants?

(1) Species (2) Class (3) Family (4) Kingdom

Ans. (3)

Sol. Family lies between genus and order.

40. Earthworm, a friend of farmer belongs to _____phylum.

(1) Arthropoda (2) Echinodermata (3) Mollusca (4) Annelida

Ans. (4)

Sol. Earthworm belongs to phyllum Annelida.

41. Identify incorrect sentence related to Asian continent:

(1) This continent is the biggest of all from the perspectives of area and population

(2) The continent got the name from the word 'Aasu'.

(3) The renaissance era was started from this continent

(4) The emergence of old religion and culture from this continent

Ans. (3)

Sol. The Renaissance era was started from this continent.

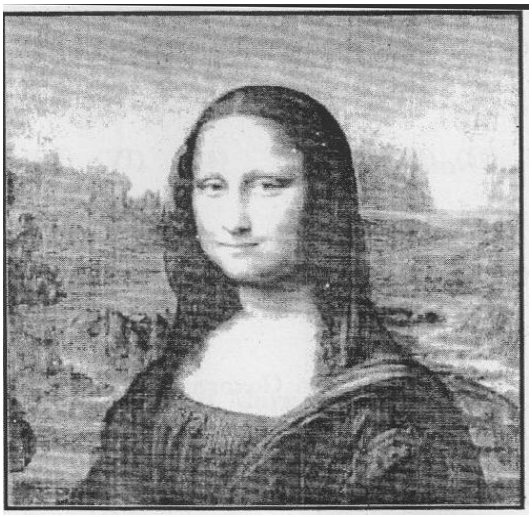
42. Which one of the following atomic reactors is not present in 'Atomic Research City' at Mumbai ?

(1) Apsara (2) Narora (3) Zarlina (4) Purnima

Ans. (2)

Sol. NARORA

43. Who was the painter of this famous immortal picture?



(1) Michealangelo (2) Leonardo-da-Vinchi (3) Raphael (4) Donato

Ans. (2)

Sol. Leonardo-da-Vinchi

44. Who one of the following was not navigator?

(1) John Cabot (2) John Key (3) Amerigo Vespucci (4) Christopher Columbus

Ans. (2)

Sol. John key

45. Arrange the following events in chronoligical sequence:

(I) Hitler adopted 4th year plan

(II) Hitler assumed the post of Prime Minister.

(III) Hitler brought out an agreement with Italy and Japan

(IV) Hitler captured the Rhineland

(1) (II), (I), (IV), (III) (2) (III), (IV), (II), (I) (3) (I), (III), (II), (IV) (4) (IV), (II), (I), (III)

Ans. (1)

Sol. Hitler assumed the post of Prime minister.

Hiter adopted the 4th year plan

Hitler captured the Rhineland

Hitller brough out an agreement with Italy and Japan.

46. Choose the inappropriate pair:

(1) Business concessions took from king - Vasco-da-Gama Zamorin

(2) Request to the Japanese Government - Commodore Perry for business concession

(3) The book written by him which was - Bartholomew Dias
created among the European people
a kind of attraction towards Africa

(4) Motivated the navigators - King Henry

Ans. (3)

Sol. The book written by him which was created among the European people a kind of attraction towards Africa.

47. Which one of the following is not computer's input device?

(1) keyboard (2) Scanner (3) Mous (4) Printer

Ans. (4)

Sol. Printer

48. _____ is the first archaic scripture of the Aryans

(1) Yajurveda (2) Samveda (3) Atharvaveda (4) Rigveda

Ans. (4)

Sol. Rigveda

49. The communist thinker Karl Marx belongs to _____country.

(1) Russia (2) France (3) Germany (4) Turkistan

Ans. (3)

Sol. Germany

50. 'UNO' was founded in _____.

(1) New York (2) Washington (3) San Francisco (4) The Hague

Ans. (3)

Sol. San Fransisco

51. Due to which action of Japan, the Asian Continent was engulfed into the international conflict?

(1) The battle between China and Japan. (2) Japan forced its army into the Indo-China region

(3) Japan attacked on Pearl Harbour (4) The rise of Militarism in Japan

Ans. (3)

Sol. Japan attacked on Pearl Harbour.

52. Tipu Sultan was defeated due to collaboration with which rulers?

(1) British - Maratha - Nizam (2) Nizam - Nawab of Karnataka - British

(3) Maratha - British - Karnataka Nawab (4) King of Travancore - Maratha - British

Ans. (1)

Sol. British - Maratha - Nizam

53. Who has written the book 'Rights of Man'?

(1) Thomas Jefferson (2) Thomas Penn (3) George Washington (4) Rousseau

Ans. (2)

Sol. Thomas Penn

54. Atomic energy plant has not been erected at _____.

(1) Talcher (2) Jadugad (3) Tuticorin (4) Nangal

Ans. (2)

Sol. Jadugad

55. Which nation is not included in the Committee, an executive body of the League of Nations?

(1) France (2) Italy (3) Soviet Russia (4) Germany

Ans. (3)

Sol. Soviet Russia.

56. Hari-ke-Pattan National Wetland is situated in _____state.

(1) West Bengal (2) Assam (3) Punjab (4) Haryana

Ans. (3)

Sol. PUNJAB

57. The correct order of Central Highlands of the Peninsular Plateau Region from East to West is

(1) Chota Nagpur → Baghelkhand → Bundelkhand → Malwa Plateau

(2) Baghelkhand → Bundelkhand → Malwa Plateau → Chota Nagpur

(3) Bundelkhand → Malwa Plateau → Chota Nagpur → Baghelkhand

(4) Malwa Plateau → Chota Nagpur → Baghelkhand → Bundelkhand

Ans. (1)

Sol. Chota Nagpur - Baghel Khand - Bundel Khand - Malwa Plateaus

58. From the physiography point of view which of the following region is situated to the east of Western Ghats known as 'Mukta Maidan'?

(1) Palkonda Hills (2) Bilgiri Hills (3) Nallamalla Hills (4) Velikonda Hills

Ans. (2)

Sol. Biligiri Hills

59. Which of the following is not included in the Deccan Plateau?

(1) Satpuda - Mahadeo Maikal Range (2) Karnataka - Telangana Plateau

(3) Malwa Plateau (4) Maharashtra Plateau

Ans. (3)

Sol. Malwa Plateau

60. Vegetal cover in this in Rajasthan Plain Region due to

(1) Winds blow with high velocity (2) Very high temperature

(3) Dry climate (4) Scanty rainfall

Ans. (4)

Sol. Scanty Rainfall

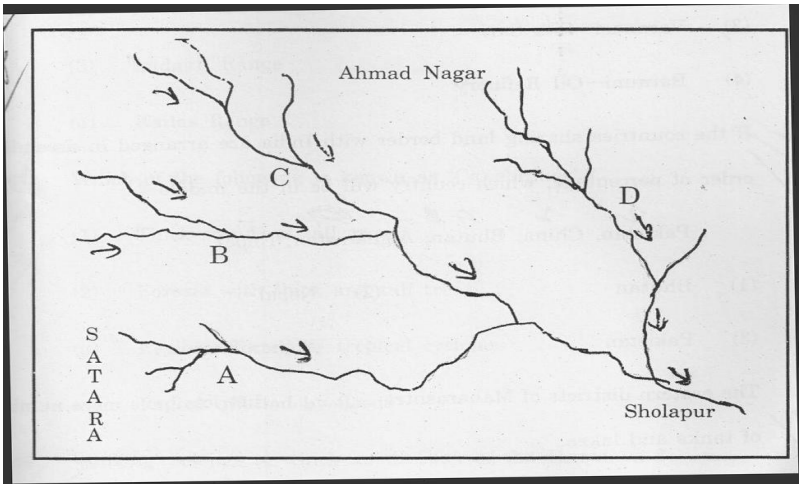
61. Along the shore of the Dal Lake in Kashmir _____ is cultivated.

(1) Apple (2) Cherry (3) Pears (4) Grapes

Ans. (4)

Sol. Grapes

62. In the figure given below, which river is indicated by alphabet 'A'?



(1) Man River (2) Bhima River (3) Sina River (4) Nira River

Ans. (1)

Sol. Man River

63. Find the wrong pair having plae and industry

(1) Durgapur - Iron and Steel Industry (2) Kanpur - Ship building Industry

(3) Varanasi - Silk Sari (4) Barauni - Oil Refinery

Ans. (2)

Sol. Kanpur - Ship building Industry.

64. If the countries sharing land border with India are arranged in asecnding order of percentage, which country will be in the middle?

Pakistan, China, Bhutan, Afghanistan, Nepal

(1) Bhutan (2) Nepal (3) Pakistan (4) Afghanistan

Ans. (2)

Sol. Nepal

65. The eastern districts of Maharashtra _____districts have more number of tanks and lakes.

(1) Bhandara and Gondia (2) Wardha and Nagpur

(3) Chandrapur and Gadchiroli (4) Bhandara and Chandrapur

Ans. (4)

Sol. Bhandara and Chandrapur

66. Which of the following regions is described as 'Cold Desert'?

(1) Sikkim Himalaya (2) Karakoram Ranges (3) Ladakh Range (4) Kailas Range

Ans. (3)

Sol. Ladakh Range

67. Which of the following is known as 'Canebrakes'?

(1) Thick stands of tall grass (2) Forests with thick and tall trees

(3) Region affected by tropical cyclones (4) Region affected by floods

Ans. (1)

Sol. Thick stands of tall grass.

68. 'Shilong' belongs to which subdivision of the Himalaya?

(1) The central Himalaya (2) The Kailas Range

(3) The Ladakh Range (4) The Eastern himalaya

Ans. (4)

Sol. The eastern Himalaya

69. The region of older alluvium of the Ganga plain is known as _____.

(1) Khadar (2) Bhabar (3) Bangar (4) Tarai

Ans. (3)

Sol. Bangar

70. 'Bundelkhand' is situated in which direction in relation to Malwa Plateau?

(1) South-East (2) South (3) West (4) North-east

Ans. (4)

Sol. North - East

71. Identify the correct pair of the following:

(i) Indian National Congress (A) Established in 1980

(ii) Bharatiya Janata Party (B) Established in 1885

(iii) Communist Party of India (C) Established in 1999

(iv) Nationalist Congress Party (D) Established in 1964

(1) (i) - (D) , (ii) - (C), (iii) - (B), (iv) - (A) (2) (i) - (C) , (ii) - (B), (iii) - (A), (iv) - (D)

(3) (i) - (D) , (ii) - (A), (iii) - (C), (iv) - (B) (4) (i) - (B) , (ii) - (A), (iii) - (D), (iv) - (C)

Ans. (4)

Sol. Indian National Congress - 1885

Bharatiya Janata Party - 1980

Communist Party of India - 1964

Nationalist Congress Party - 1999

72. Which one of the following is not applicable for the Parliamentary Democracy?

(1) Two chief executives

(2) Power vested in the Parliament

(3) Executive chiefs cannot be removed before the end of his tenure

(4) In England and India, Parliamentary democracy is in existence

Ans. (3)

Sol. Executive chiefs cannot be removed before the end of his tenure.

73. Who worked as the Chairperson of the Advisory Committee on fundamental rights of the Constituent Assembly?

(1) Vallabhbhai Patel (2) Pandit Jawaharlal

(3) Dr. Rajendra Prasad (4) Dr. Babasaheb Ambedkar

Ans. (1)

Sol. Vallabhbhai Petal

74. Who has written a book called 'Stree-Purush Tulana' published in 1882?

(1) Mahatma Phule (2) Shahu Maharaj (3) Tarabai Shinde (4) Savitribai Phule

Ans. (3)

Sol. Tarabai Shinde

75. People tend to migrate to more developed regions is an example of which inequality?

(1) Political (2) Regional (3) Social (4) Linguistic

Ans. (2)

Sol. Regional

76. _____refers to various activities related to the production, distribution and consumption of goods and services in a certain Geographical region.

(1) Political Sovereignty (2) Sectoral Distribution (3) An Economy (4) Natural Resources

Ans. (3)

Sol. An Economy

77. Which day of the following is celebrated as World Consumer Day?

(1) 15th March (2) 24th December (3) 10th December (4) 8th April

Ans. (1)

Sol. 15^{th} March

78. "Economics is a science to study human well-beings/welfare." Who has defined it?

(1) Prof. Adam Smith (2) Leonnel Robins (3) Prof. Kemmerer (4) Prof. Alfred Marshall

Ans. (4)

Sol. Prof. Alfred Marshall

79. On which factor of the following the decision regarding"How much to produce" does not depend upon?

(1) Population growth (2) Level of production (3) Size of market (4) Availability of resources

Ans. (2)

Sol. Level of Production

80. Which is not a fiscal measure of the following to control inflation?

(1) Increase in taxation (2) Public Borrowings (3) Overvaluation (4) Increase in Bank rate

Ans. (4)

Sol. Increase in Bank Rate.

81. In an A.P. the sum of 'n' terms is $5n^2 - 5n$. Find the 10th term of the A.P.

(1) 80 (2) 90 (3) 100 (4) 110

Ans. (2)

Sol. Sum of n terms = $5n^2 - 5n$

S_1 = sum of 1term = 5 - 5

$= 0$

$\therefore \quad a_1 = 0 \quad ....(1)$

S_2 = sum of 2 terms = $5\,(2)^2 - 5(2)$

$= 10$

$\therefore a_1 + a_2 = 10 \quad .....(2)$

Solving (1) and (2)

$a_2 = 10$

$\therefore \quad a_1 + d = 10 \quad \rightarrow d = 10$

$\therefore \; a_{10} = a + 9d$

$= 0 + 9(10) = 90$

82. If $\frac{a}{x+y}=\frac{b}{y+z}=\frac{c}{z-x}$, then which of the following equations is true?

(1) $a = b + c$ (2) $c = a + b$ (3) $b = a \times c$ (4) $b = a + c$

Ans. (4)

Sol. Let $\frac{a}{x+y}=\frac{b}{y+z}=\frac{c}{z-x}=k$

$\therefore \quad a = xk + yk \quad ....(1)$

$b = yk + zk \quad ....(2)$

$c = zk - xk \quad .....(3)$

equation (1) + (3)

$a + c = zk - xk + xk + yk$

$= zk + yk$

$= b$

$\therefore\ a + c = b$

83. The difference between the two roots of a quadratic equation is 2 and the difference between the cubes of the roots is 98, then which of the following is that quadratic equation?

(1) $x^2 - 8x + 15 = 0$ (2) $x^2 + 8x - 15 = 0$ (3) $x^2 + 5x + 15 = 0$ (4) $x^2 - 5x - 15 = 0$

Ans. (1)

Sol. Given, $\alpha - \beta = 2$ & $\alpha^3 - \beta^3 = 98$

$\Rightarrow (\alpha - \beta)(\alpha^2 + \beta^2 + \alpha\beta) = 98$

$\Rightarrow 2[(\alpha - \beta)^2 + 3\alpha\beta] = 98$

$\Rightarrow 4 + 3\alpha\beta = 49$

$\Rightarrow \underline{\alpha\beta = 15}$

$\therefore\ (\alpha + \beta)^2 = (\alpha - \beta)^2 + 4\alpha\beta$

$= 4 + 60 = 64,$

$\alpha + \beta = 8$

$\therefore$ The equation is $x^2 - 8x + 15 = 0$

84. From a pack o 52 playing cards, face club cards are removed. The remaining cards are well shuffled and a card is drawn at random. Find the probability that the card drawn is a Heart card.

(1) $\frac{1}{4}$ (2) $\frac{13}{49}$ (3) $\frac{3}{52}$ (4) $\frac{49}{52}$

Ans. (2)

Sol. From 52 cards, face club cards are removed,

$\therefore$ Remaining cards = 49

$\therefore$ P(a heart card) = $\frac{13}{49}$

85. A boat takes 7 hours to travel 30 km upstream and 28 km downstream. It takes 5 hours to travel 21 km upstream and to return back. Find the speed of the boat in still water.

(1) 10 km/hr (2) 20 km/hr (3) 14 km/hr (4) 6 km/hr

Ans. (1)

Sol. Let speed of Boat = x kmph

speed of water = y kmph

$$\therefore \quad \frac{30}{x-y}+\frac{28}{x+y}=7 \quad \& \quad \frac{21}{x+y}+\frac{21}{x-y}=5$$

Solving this,

We get $x + y = 14$

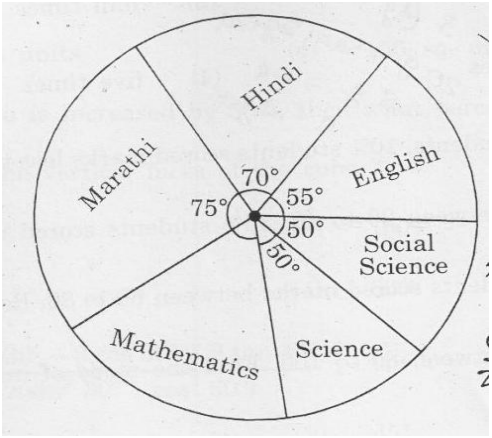
$x - y = 6$

$\therefore$ Solving again

$x = 10$ and $y = 4$

$\therefore$ speed of boat = 10 kmph

86. The marks scored by a student in an examination of 600 marks is shown in the following pie diagram. If he has scored 60 marks in Mathematics, then find the percentage of marks that he secured in the examination.



(1) 60% (2) 50% (3) 75% (4) 55%

Ans. (1)

Sol. Total marks = 600

Degrees occupied by maths = 60^0

Marks scored by maths = 60^0

Total marks scored = 360

$$\% \text{ of marks} = \frac{360}{600}\times 100 = 60\%$$

87. $\sqrt{m^4n^4}\times\sqrt[6]{m^2n^2}\times\sqrt[3]{m^2n^2}=(mn)^2$, then find the value of k.

(1) 6 (2) 3 (3) 2 (4) 1

Ans. (2)

Sol. $\sqrt{m^4n^4}\times\sqrt[6]{m^2n^2}\times\sqrt[3]{m^2n^2}=(mn)^k$

$\Rightarrow (mn)^{4/2} \times (mn)^{2/6} \times (mn)^{2/3} = (mn)^k$

$$\Rightarrow (mn)^{2+\frac{1}{3}+\frac{2}{3}}=(mn)^k$$

$\Rightarrow$ k = $2+\frac{1}{3}+\frac{2}{3}$

k = 3

88. The cost of 20 guavas and 5 apples is same as that of 12 guavaes and 7 apples, then how many times the cost of an apple is to that of a guava?

(1) two times (2) half times (3) four times (4) five times

Ans. (3)

Sol. cost of 1 Guava = G

Cost of 1 Apple = A

$\therefore$ 20G + 5A = 12 G + 7A

$\Rightarrow$ 8G = 2A

$\Rightarrow$ A = 4G

Cost of 1 apple is 4 times of Guava.

89. In a group of students, 10% students scored marks less than 20, 20% students scored marks between 20 to 40, 35% students scored makrs between 40 to 60 and 20% students scored makrs between 60 to 80. Remaining 30 students scored marks between 80 to 100. Find the mode of marks.

(1) 30 (2) 50 (3) 60 (4) 70

Ans. (2)

Sol. Remaining student of 30 scored 80 - 100

15% of x = 30

$\Rightarrow \frac{15}{x} = 30 \Rightarrow x = 200$

$\therefore$ 0 - 20 $\Rightarrow$ 20 students

20 - 40 $\Rightarrow$ 40 students

40 - 60 $\Rightarrow$ 70 students $\Rightarrow$ Modal Group

60 - 80 $\Rightarrow$ 40 students

80 - 100 $\Rightarrow$30 students

$\therefore$ Mode = $\frac{40+60}{2} = 50$

90. ***One of the root of a quadratic equation is*** $(3-\sqrt{2})$ ***, then which of the following is that equations?***

(1) $(x^2 - 6x - 7) = 0$ (2) $(x^2 + 6x - 7) = 0$ (3) $(x^2 + 6x + 7) = 0$ (4) $(x^2 - 6x + 7) = 0$

Ans. (4)

Sol. One root = $3-\sqrt{2}$

other root will be = $3+\sqrt{2}$

$\therefore$ sum of roots = $3+\sqrt{2}+3-\sqrt{2}$

= 6

Product of roots = $(3+\sqrt{2})(3-\sqrt{2})$

= 9 - 2 = 7

The equations is $x^2 - 6x + 7 = 0$

91. In Δ ABC, m ∠ B = 90^0, AB = $4\sqrt{5}$. BD ⊥ AC, AD = 4, then A(Δ ABC) = ?

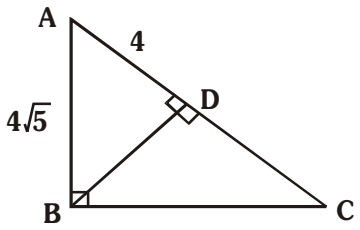
(1) 96 sq. units (2) 80 sq. units (3) 120 sq. units (4) 160 sq. units

Ans. (2)

Sol. $BD = \sqrt{(4\sqrt{5})^2 - (4)^2}$

$= \sqrt{80 - 16} = \sqrt{64}$

$= 8$



Also $\frac{1}{BD^2} = \frac{1}{AB^2} + \frac{1}{BC^2}$

$= \frac{1}{BC^2} = \frac{1}{BD^2} - \frac{1}{AB^2}$

$\frac{1}{BC^2} = \frac{AB^2 - BD^2}{BD^2 . AB^2}$

$BC = \sqrt{\frac{BD^2 . AB^2}{AB^2 - BD^2}}$

$BC = \frac{BD.AB}{\sqrt{AB^2 - BD^2}} = \frac{8 \times 4\sqrt{5}}{4}$

$= 8\sqrt{5}$

Area of ΔABC = $\frac{1}{2} \times 4\sqrt{5} \times 8\sqrt{5}$ = 80 sq. units.

92. Side of a cube is increased by 50%, then what percent increase will be in the area of the vertical faces of the cube?

(1) 125% (2) 150% (3) 100% (4) 50%

Ans. (1)

Sol. Let the side be a

new side = 1.5 a

Area of 4 walls (old) = $4a^2$

Area of 4 walls (new) = 4 x $2.25a^2$ = $9a^2$

∴ % increase = $\frac{9a^2 - 4a^2}{4a^2} \times 100 = \frac{5}{4} \times 100$

% incrwase = 125%

93. sinx = $\frac{6\sin 30^0 - 8\cos 60^0 + 2\tan 45^0}{2(\sin^2 30^0 + \cos^2 60^0}$, then x = how much?

(1) 30^0 (2) 45^0 (3) 60^0 (4) 90^0

Ans. (4)

Sol. $\sin x = \frac{6 \sin 30^0 - 8\cos 60 + 2 \tan 45}{2(\sin^2 30 + \cos^2 60)}$

$\Rightarrow \sin x = \frac{6 \times \frac{1}{2} - 8 \times 5\frac{1}{2} + 2}{2((\frac{1}{2})^2 + (\frac{1}{2})^2)}$

$= \frac{3 - 4 + 2}{2\left(\frac{1}{2}\right)} = \frac{1}{1}$

$\sin x = 1$

$\therefore \quad x = 90^0$

94. P ≡ (1, -9), Q ≡ (2, 5) and R ≡(6,7) are the co-ordinates of the vertices of ΔPQR, then find the co-ordinates of the centroid from the following alternatives given:

(1) $\left(\frac{10}{3}, \frac{-17}{3}\right)$ (2) (1, 3) (3) (3, 1) (4) (-3, 1)

Ans. (3)

Sol. P(1, -9)

Q(2, 5)

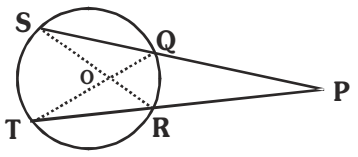
R(6,7)

$\therefore$ Centroid (x, y) = $\left(\frac{1+2+6}{3}, \frac{-9+5+7}{3}\right)$

$= \left(\frac{9}{3}, \frac{3}{3}\right)$

Centroid = (3, 1)

95. In the following figure secants QS and TR intersect each other at point P, whcih is outside the circle. O is the point of intersection of chords SR and TQ. If OS = 5cm, Ot = 10cm, TR = 12 cm, PR = 8cm, then find ℓ(PQ)



(1) 6cm (2) 10 cm (3) 12 cm (4) 16 cm

Ans. (2)

Sol. OS = 5 cm

OT = 10 cm

TR = 12 cm

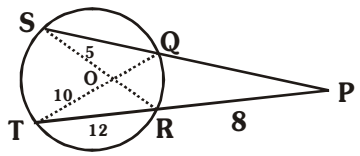
PR = 8 cm

Let QP - x

$\Delta OQS \sim \Delta ORT$

Δ SQ = 6 cm

Also, $\Delta PTQ \sim \Delta PSR$



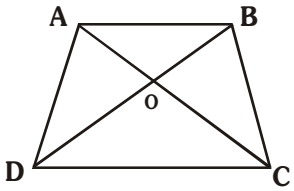
$$\therefore \quad \frac{PT}{PS} = \frac{QP}{PR}$$

$$\Rightarrow \frac{20}{6+x} = \frac{x}{8} \qquad \Rightarrow x^2 + 6x - 160 = 0$$

$$\Rightarrow x = 10, -16$$

$\therefore$ PQ = 10 cm

96. In the following figure, seg AB $\parallel$ seg CD. Diagonals AC and BD intersect at point O. If AO : OC = 1 : 3, then $\frac{A(\Delta AOB)}{A(\Delta ABD)} = ?$

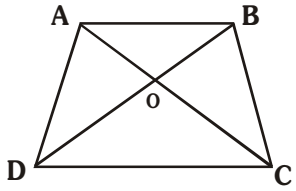


(1) $\frac{1}{4}$ (2) $\frac{1}{9}$ (3) 16 (4) 116

Ans. (1)

Sol. If AO : AC : 1:3

$$\frac{\text{Area of } \Delta AOB}{\text{Area of } \Delta BOC} = \frac{1}{3}$$



Let Area of ΔAOB = x

$\therefore$ Area of ΔBOC = 3x

Δr(ABC) = 4x

Area ΔABC = ΔABD (same base and Parallel lines)

$\therefore$ Area of Δ ABD = 4x

$$\frac{\text{Area of } \Delta AOB}{\text{Area of } \Delta ABD} = \frac{x}{4x} = \frac{1}{4}$$

97. In Δ ABC points P and Q trisect side AB, points T and U trisect side AC and points R and S trisect side BC. Then perimeter of hexagon PQRSTU is how many times of the perimeter of ΔABC?

(1) $\frac{1}{3}$ times (2) $\frac{2}{3}$ times (3) $\frac{1}{6}$ times (4) $\frac{1}{2}$ times

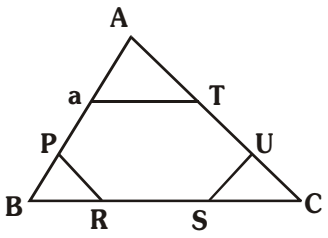
Ans. (2)

Sol. Let AB be x

$\therefore$ AQ = QP = BP = $\frac{x}{3}$

Let BC be y

$\therefore$ BR = RS = SC = $\frac{y}{3}$



Let AC = z

AT = TU = UC = z/3

Opposite side of Hexagon are equal

$\therefore$ Perimeter of Hexagon = PQ + QT + TU + US + RS + PR

$$=\left(\frac{x}{3}+\frac{y}{3}+\frac{z}{3}\right)\times 2$$

$$\therefore \quad \frac{\text{Perimeter of Hexagon}}{\text{Perimeter of } \Delta \text{ ABC}} = \frac{2/3(x+y+z)}{(x+y+z)} = \frac{2}{3}$$

98. $\frac{\sin^4\theta - \cos^4\theta}{1 - \sin^2\theta}$ = how much ?

(1) $1 - \cot^2\theta$ (2) $1 - \tan^2\theta$ (3) $\tan^2\theta - 1$ (4) $\cot^2\theta - 1$

Ans. (3)

Sol. $$\frac{\sin^4\theta - \cos^4\theta}{1 - \sin^2\theta} = \frac{(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)}{(1 - \sin^2\theta)}$$

$$= \frac{\sin^2\theta - \cos^2\theta}{\cos^2\theta}$$

$$= \tan^2\theta - 1$$

99. The radius of a cylindrical vessel is 7cm and its height is 12 cm. $\frac{2}{3}$ of the vessel is filled with water. A sphere having radius 6cm is dropped into the water. Find the volume of the water that will come out of the vessel.

(1) 196 π cm^3 (2) 92 π cm^3 (3) 288 π cm^3 (4) 588 π cm^3

Ans. (2)

Sol. Radius of cylindrical vessel = 7 cm

$\therefore$ Volume = $\pi r^2 h$

$= 588\pi$

Fill with water = $\frac{2}{3}\times 588\pi$

$= 392\pi$

Volume of sphere = $\frac{4}{3}\times\pi\times 216$

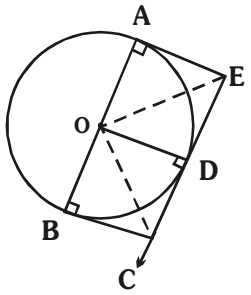
$= 288\pi$

$\therefore$ Water spilled outside

$= (392 + 288)\,\pi - 588\pi$

$= 92\,\pi$

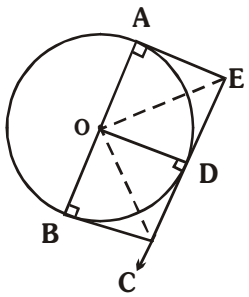
100. Radius of a circle with centre 'O' is $4\sqrt{5}$ cm. AB is the diameter of the circle AE || BC, BC = 8cm. Line EC is tangent to the circle at point D. Find the length of DE.



(1) $4\sqrt{5}$ cm (2) $6\sqrt{5}$ cm (3) 8 cm (4) 10 cm

Ans. (4)

Sol. AE ||BC



$\therefore \angle OBC = 90$

$AO = OD = OB = 4\sqrt{5}$ cm

$BC = 8$cm

$OC = \sqrt{8^2 + (4\sqrt{5})^2}$

$= 12$ cm

$\angle EOC = 90^0, \quad \therefore \quad \frac{1}{OD^2} = \frac{1}{OE^2} + \frac{1}{OC^2}$

$\therefore OE = 6\sqrt{5}$ cm

$AE = 10$cm (By phthagorous)

$\therefore$ ED = 10 cm