

SSC COMBINED GRADUATE LEVEL TIER-I (RE-EXAM-2013) , 27-04-2014 – PREVIOUS YEAR PAPER

GENERAL AWARENESS

1. The type of fruit obtained from a multicarpillary, apocarpous gynoecium is:

- (1) composite
- (2) aggregate
- (3) simple
- (4) multiple

Solution:2

2. The threshold frequency is the frequency below which :

- (1) photo current increases with voltage
- (2) photo current decreases with voltage
- (3) photo electric emission is not possible
- (4) photo current is constant

Solution:3

3. Sir C. V. Raman was awarded Nobel Prize for his work on:

- (1) Light Scattering
- (2) Radio activity
- (3) Cryogenics
- (4) Sonometer

Solution:1

4. Tesla is a unit of magnetic :

- (1) flux
- (2) induction
- (3) moment
- (4) field

Solution:4

5. The percentage of carbon in cast iron is :

- (1) 0.01 to 0.25
- (2) 0.5 to 1.5

(3) 6 to 8

(4) 3 to 5

Solution:4

6. The damage of the human body due to radiation X-rays or g- rays etc,) is measured in :

(1) Reins

(2) Roentgen

(3) Curie

(4) Rads

Solution:1

7. The Minimum Support Price for food grains was introduced in the year :

(1) 1944

(2) 1964

(3) 1974

(4) 1954

Solution:3

8. Total assembly segments in Delhi are :

(1) 50

(2) 60

(3) 70

(4) 40

Solution:3

9. Transition ions absorb light in :

(1) infrared region

(2) ultraviolet region

(3) microwave region

(4) visible region

Solution:4

10. Virtually treeless, sparse vegetation is found in :

(1) Taiga

(2) Alpine

(3) Tundra

(4) Chapparal

Solution:3

11. Flywheel is an important part of a steam engine' because it :
- (1) accelerates the speed of the engine
 - (2) helps the engine in keeping the speed uniform
 - (3) decreases the moment of inertia
 - (4) gives strength to the engine

Solution:2

12. Soil factors are otherwise known as :

- (1) Edaphic factors
- (2) Biotic factors
- (3) Physiographic factors
- (4) Climatic factors

Solution:1

13. Who benefits the most during the inflationary period ?

- (1) corporate servants
- (2) creditors
- (3) entrepreneurs
- (4) government servants

Solution:3

14. Which of the following does not have a Stupa ?

- (1) Ranchi
- (2) Sanchi
- (3) Barhut
- (4) Dhamek

Solution:1

15. The plants, which grow under water stress conditions of deserts are :

- (1) Epiphytes
- (2) Xerophytes
- (3) Heliophytes
- (4) Sciophytes

Solution:2

16. Coupling and repulsion are the two states of :

- (1) linkage
- (2) chiasma
- (3) mutation
- (4) crossing over

Solution:1

17. The freezing point of fresh water is

- (1) 4°C
- (2) 3°C
- (3) 5°C
- (4) 0°C

Solution:4

18. Stamens are fused with each other by their anthers and also with the petals in :

- (1) Leguminosae
- (2) Liliaceae
- (3) Compositae
- (4) Euphorbiaceae

Solution:3

19. Deficiency of iron causes :

- (1) Goitre
- (2) Polio
- (3) Rickets
- (4) Scurvy

Solution:

20. Which of the following books is not written by Jawaharlal Nehru ?

- (1) Discovery of India
- (2) My Experiments with Truth
- (3) An Autobiography
- (4) Glimpses of World History

Solution:2

21. 'Democratic Centralism' is an important feature of a :

- (1) Communist state
- (2) Democratic state
- (3) Totalitarian' state
- (4) Socialist state

Solution:1

22. The Constitution of India, describes India as :

- (1) A Federation
- (2) A quasi-federal

- (3) Unitary
- (4) Union of states

Solution:4

23. 'Shadow Cabinet is the feature of Administrative system of :

- (1) Britain
- (2) USA
- (3) France
- (4) Japan

Solution:1

24. Which National Highway is called Shershah Sun Marg ?

- (1) National Highway No. 3
- (2) National Highway No. 8
- (3) National Highway No. 7
- (4) National Highway No. 1

Solution:1

25. Which of the followings is not correct ?

- (1) NMA-National Monuments Authority
- (2) PIL-Public Interest Litigation
- (3) NOT-National Growth Tribunal
- (4) MSP-Minimum Support Price

Solution:3

26. An increase in the quantity supplied suggests :

- (1) a leftward shift of the supply curve
- (2) a movement up along the supply curve
- (3) a movement down along the supply curve
- (4) a rightward shift of the supply curve

Solution:2

27. Who was the Delhi Sultan to impose Jizya even on the Brahmins ?

- (1) Ala-ud-din Khilji
- (2) Firuz Tughluq
- (3) Muhammad Tughluq
- (4) Balban

Solution:2

28. Dactylogram is related with :

- (1) teleprinter
- (2) perumbulator
- (3) cereals
- (4) finger print

Solution:4

29. Which body is constituted by the President of India to advise on the decision of Central Resources between the centre and the state ?

- (1) Tariff Commission
- (2) Finance Commission
- (3) Planning Commission
- (4) Taxation Enquiry Commission

Solution:2

30. "Ryder Cup" is awarded to the players of :

- (1) Baseball
- (2) Basketball
- (3) Cards
- (4) Golf

Solution:4

31. The site of birth [nativity] of Gautam Buddha is marked by :

- (1) a monastery
- (2) a "Rummindei Pillar" of Ashok Maurya
- (3) a statue
- (4) a Peepal Tree

Solution:2

32. Preparation of butter, ghee by a household for their own use is a part of :

- (1) own-account production
- (2) household capital formation
- (3) industrial production
- (4) consumption

Solution:4

33. Potato was introduced to Europe by :

- (1) Portuguese
- (2) Germans
- (3) Spanish
- (4) Dutch

Solution:3

34. The current spell of cold wave in the US has been a fall out of the :
- (1) polar vortex
 - (2) biodiversity and habitats
 - (3) climate and energy
 - (4) political administration

Solution:1

35. "Krishi Karman Award" 201213 for all time record in food grain production was given to :
- (1) Madhya Pradesh
 - (2) Haryana
 - (3) Tamil Nadu
 - (4) Odisha

Solution:4

36. Consumer Protection Act 1986, was amended in :
- (1) 1992
 - (2) 1993
 - (3) 1994
 - (4) 1991

Solution:

37. The compound that has the least value for octane number is :
- (1) 2-methyl heptane
 - (2) Iso-octane
 - (3) 2,2-dimethyl hexane
 - (4) n-heptane

Solution:4

38. The unit of noise pollution (level) is :
- (1) decibel
 - (2) decimal
 - (3) Ppm
 - (4) None of these

Solution:1

39. Which one of the following is used as secondary storage system in computer ?
- (1) RAM

- (2) Floppy
- (3) EPROM
- (4) ROM

Solution:2

40. Where does the cabbage store food ?

- (1) Leaves
- (2) Stem
- (3) Fruit
- (4) Root

Solution:1

41. Who among the following is the founder of the "Azad Hind Fauj" ?

- (1) Lala Har Dayal
- (2) Subash Chandra Bose
- (3) Vir Savarkar
- (4) Chandrashekhar Azad

Solution:2

42. The production, marketing, storage, advertisement and consumption of smokeless tobacco is banned in :

- (1) Assam
- (2) Arunachal Pradesh
- (3) Nagaland
- (4) Meghalaya

Solution:1

43. The pair of compounds used as anaesthetic in medicines :

- (1) Ether, Ammonia
- (2) Nitrous oxide, Chloroform
- (3) Chloroform, Nitrogen dioxide
- (4) Nitrogen dioxide, ether

Solution:2

44. In relation to the State Government, local government exercises :

- (1) Co-ordinate Authority
- (2) Delegated Authority
- (3) Superior Authority
- (4) Independent Authority

Solution:2

45. Study of organisms in relation to their environment is called :

- (1) Ecology
- (2) Zoology
- (3) Entomology
- (4) Palynology

Solution:1

46. Who is known as the Father of 'Indian Unrest' ?

- (1) Bal Gangadhar Tilak
- (2) Lalalajpat Rai
- (3) Aurobindo Ghosh
- (4) Bipin Chandrapal

Solution:1

47. Obsidian, Andesite, Gabbro and Perodite are :

- (1) Metamorphic rocks
- (2) Intrusive rocks
- (3) Sedimentary rocks
- (4) Extrusive rocks

Solution:

48. Who said that "Where there is no Law there will not be Liberty" ?

- (1) Karl Marx
- (2) Plato
- (3) Machiavelli
- (4) John Locke

Solution:4

49. The UNIX operating system is suitable for :

- (1) Multi user
- (2) Real-Time Processing
- (3) Distributed Processing
- (4) Single user

Solution:1

50. Section of IPC, which deals with LGBT (Lesbian, Gay, Bisexual and Transgender) community is :

- (1) 377
- (2) 376
- (3) 370

(4) None of these

Solution:1



ENGLISH COMPREHENSION

Directions (1-5) : In the following questions, some parts of the sentences have errors and some are correct. Find out which part of a sentence has an error. The number of that part is your answer. If a sentence is free from error, then your answer is (4) i.e. No error.

1. After tasting both / (1) John prefers / (2) tea than coffee. / (3) No error (4)

Solution:3

2. I loved / (1) the drawings / (2) they were so real. / (3) No error (4)

Solution:3

3. Suddenly they saw a car corning / (1) at a break neck speed. / An old man were crossing the road at the zebra crossing. / (3) No error (4)

Solution:3

4. I sprained my ankle / (1) when I was / (2) playing basketball. / (3) No error (4)

Solution:4

5. It is time / (1) we should accept all our people as equals / (2) and as partners in the task of building a strong and united nation. / (3) No error (4)

Solution:2

Directions (6-10) : In the following questions, sentences are given with blanks to be filled with an appropriate word(s). Four alternatives are suggested for each question. Choose the correct alternative out of the four.

6. Leila said the new restaurant was nothing to write about. She thought it was

.....

- (1) just average
- (2) really terrible
- (3) splendid
- (4) excellent

Solution:1

7. My Nigerian friend, Fela is having trouble finding work here in London, but he says if push comes to shove he can always

- (A) go to jail
- (2) win the lottery

(3) end of the journey that is life

(4) go back to Nigeria

Solution:4

8. If you say to someone "You're so full of yourself " they'll probably feel

(1) upset

(2) pleased

(3) calm

(4) proud

Solution:4

9. The archer missed the..... by an inch.

(1) score

(2) point

(3) blow

(4) aim

Solution:4

10. Bob and Jane decided to tie the knot because

(1) they loved one another

(2) they needed to save money

(3) they wanted to make a long rope

(4) it had come undone

Solution:1

Directions (11-13): In the following questions, out of the four alternatives, choose the one which best expresses the meaning of the given word.

11. CREDIBLE

(1) Charming

(2) Serious

(3) Believable

(4) Worthy

Solution:3

12. EXTRICATE

(1) Free

(2) Tie

(3) Complicate

(4) Pull

Solution:1

13. OBSTREPEROUS

- (1) Unruly
- (2) Lazy
- (3) Awkward
- (4) Sullen

Solution:1

Directions (14-16) : In the following questions, choose the word opposite in meaning to the given word.

14. ACQUIT

- (1) Despair
- (2) Mild
- (3) Smart
- (4) Condemn

Solution:4

15. DISSENT

- (1) Discord
- (2) Disagreement
- (3) Unacceptable
- (4) Agreement

Solution:4

16. GROUP

- (1) Singular
- (2) Individual
- (3) Alone
- (4) Solitary

Solution:2

Directions (17-21) : In the following questions, four alternatives are given for the Idiom/ Phrase printed in **bold**. Choose the alternative which best expresses the meaning of the Idiom/Phrase.

17. After his business failed, he had to work very hard to **keep the wolf from the door**.

- (1) keep away extreme poverty
- (2) earn an honest living
- (3) regain his lost position
- (4) defend from enemies

Solution:1

18. The mention of her former husband's name still makes Rita **foam at the mouth**.

- (1) angry
- (2) vomit
- (3) shy
- (4) fall sick

Solution:1

19. We must **husband our resources** against hard times.

- (1) save
- (2) support
- (3) sing
- (4) concede

Solution:1

20. The newly elected Chief Minister has promised to **bring about** changes in the state.

- (1) produce
- (2) make
- (3) carry
- (4) cause to happen

Solution:4

21. He **gave vent to** his pleasure with a smile.

- (1) shared
- (2) allowed
- (3) expressed
- (4) enjoyed

Solution:3

Directions (22-31) : In the following questions, a sentence/ part of the sentence is printed in **bold**. Below are given alternatives to the **bold** sentence/part of the sentence at (1). (2) and (3) which may improve the sentence. Choose the correct alternative. In case no improvement is needed, your answer is (4).

22. Then with all his loot he sailed **inwards** Scotland's shore.

- (1) onwards
- (2) towards
- (3) forward
- (4) No improvement

Solution:2

23. Can you please **give me** some leave?

- (1) grant for me
- (2) grant me
- (3) grant from me
- (4) No improvement

Solution:2

24. The office is **soon to** be closed.

- (1) just to
- (2) about to
- (3) where to
- (4) No improvement

Solution:2

25. The teacher was very **proficient** in his subject.

- (1) expert
- (2) well versed
- (3) proficient
- (4) No improvement

Solution:2

26. He found a **wooden chair that has broken** in the room.

- (1) wooden and broken chair
- (2) broken wooden chair
- (3) broken and wooden chair
- (4) No improvement

Solution:2

27. The robbers fled before the police **came**.

- (1) arrived
- (2) were coming
- (3) had come
- (4) No improvement

Solution:1

28. The hosts were taken aback when many guests who **had been invited** did not turn up for the party.

- (1) had been invited
- (2) had invited
- (3) was invited

(4) No improvement

Solution:4

29. The master aimed **a blow to** Oliver's head with the ladle.

(1) a throw at

(2) a punch in

(3) a blow at

(4) No improvement

Solution:3

30. The **athletes who have won prizes** are being honoured.

(1) The prize winning athletes

(2) The athletes who are given prizes

(3) The athletes who are winning prizes

(4) No improvement

Solution:4

31. Motor cars carry people **from one place to another.**

(1) from place to place

(2) about the place

(3) for travel

(4) No improvement

Solution:1

Directions (32-38) : In the following questions, out of the four alternatives, choose the one which can be substituted for the given words/ sentence.

32. An extract from a book of writing

(1) Excerpt

(2) Review

(3) Footnote

(4) Preface

Solution:1

33. One living on vegetables

(1) vegetarian

(2) herbivore

(3) carnivore

(4) barbarian

Solution:1

34. A person who supports or speaks in favour of something
- (1) advocate
 - (2) assistance
 - (3) adviser
 - (4) volunteer

Solution:1

35. The firing of many guns at the same time to mark an occasion
- (1) fusillade
 - (2) salvo
 - (3) attack
 - (4) volley

Solution:1

36. A word that reads the same backwards as forwards
- (1) acrostic
 - (2) homophone
 - (3) acronym
 - (4) palindrome

Solution:4

37. A person who is self-centred
- (1) egoist
 - (2) masochist
 - (3) narcissist
 - (4) eccentric

Solution:1

38. A principle or standard by which anything is or can be judged
- (1) manifesto
 - (2) copyright
 - (3) epitome
 - (4) criterion

Solution:4

Directions (39-40) : In the following questions, four words are given in each question, out of which only one word is correctly spelt. Find the correctly spelt word.

39. (1) Possession
(2) Possesian

(3) Posseseon

(4) Posessian

Solution:1

40. (1) Immakulate

(2) Immaculate

(3) Immaculete

(4) Imakulate

Solution:2

Directions (41-50) : In the following questions, you have two passages with 5 questions in each passage. Read the passages carefully and choose the best answer to each question out of the four alternatives.

PASSAGE -I

(Q.Nos. 41 to 45)

We are living in the Age of Science. Everyday new inventions are being made for the good of humanity. The scientific inventions began after the Industrial Revolution of 1789. Within these 200 years, science has made a wonderful progress. The aeroplane is one of the most important inventions of science during the Modern Age. It is the fastest means of transport know so far. An aeroplane resembles a flying bird in shape. Inside there are seats for the passengers and a cabin for the pilot. This cabin is called a cockpit. It has an engine that is worked by petrol. It is all made up of metal and can fly at a very high speed. Before taking off it runs on the runway for some distance to gather speed. Then it suddenly hops up the earth and takes off.

41. The scientific invention began after the Industrial Revolution of.....

(1) 1789

(2) 1889

(3) 1879

(4) 1779

Solution:1

42. The cabin for the pilot is called a

(1) cubicle

(2) cube

(3) cockpit

(4) chamber

Solution:3

43. An aeroplane has an engine that is worked by

- (1) diesel
- (2) petrol
- (3) steam
- (4) gas

Solution:2

44. The..... is one or the most important inventions of science during the Modern Age.

- (1) ship
- (2) aeroplane
- (3) motor vehicle
- (4) train

Solution:2

45. We are living in the

- (1) Age of inventions
- (2) Age of industrialisation
- (3) Modern Age
- (4) Age of science

Solution:4

PASSAGE-II

(Q. Nos. 46 to 50)

The National Highways Network of India measures over 70,934 km as of 2010, including over 1,000 km of limited-access expressways. Out of 71,000 km of National Highways 15,000 plus km are 4 or 6 lanes and remaining 50,000 km are 2 lanes. The National Highways Authority of India (NHAI) is the nodal agency responsible for building, upgrading and maintaining most of the national highways network. The National Highways Development Project (NHDP) is a major effort to expand and upgrade the network of highways. NHAI often uses a public-private partnership model for highway development, maintenance and toll-collection. National highways constituted about 2% of all the roads in India, but carried about 40% of the total road traffic as of 2010. The majority of existing national highways are two-lane roads (one lane in each direction), though much of this is being expanded to four-lanes, and some to six or eight lanes. Some sections of the network are toll roads. Over 30,000 km of new highways are planned or under construction as part of the NHDP, as of 2011. This includes over 2,600 km of expressways currently under construction.

46. What is the current measurement of expressways under construction in India ?
(1) 15,000 km

- (2) 30,000 km
- (3) 2,600 km
- (4) 1,000 km

Solution:3

47. What is the responsibility of the NHAI ?

- (1) planning of National Highways
- (2) building, upgrading and maintaining of National Highways
- (3) control of National Highways
- (4) expansion of National Highways

Solution:2

48. What is the measurement of two-lane National Highways of India ?

- (1) 15,000 km
- (2) 61,000 km
- (3) 50,000 km
- (4) 71,000 km

Solution:3

49. What percentage of roads in India are National Highways

- (1) 2%
- (2) 30%
- (3) 4%
- (4) 40%

Solution:1

50. The majority of National Highways in India have :

- (1) two-lanes
- (2) six-lanes
- (3) eight-lanes
- (4) four-lanes

Solution:1



QUANTITATIVE APTITUDE

1. If the side of a square is reduced by 50%, its area will be reduced by
- (1) 75%
 - (2) 80%
 - (3) 60%
 - (4) 50%

Solution:1

(1) Required percentage decrease

$$= \left(-50 - 50 + \frac{-50 \times -50}{100} \right) \%$$

$$= -100 + 25 = -75\%$$

2. Two triangles ABC and PQR are congruent. If the area of A ABC is 60 sq. cm, then area of A PQR will be
- (1) 60 sq.cm
 - (2) 30 sq.cm
 - (3) 15 sq.cm
 - (4) 120 sq.cm

Solution:1

(1) Both the triangles are congruent.

$$\therefore \Delta ABC = 60 \text{ sq.cm.}$$

$$\Delta PQR = 60 \text{ sq.cm.}$$

3. The least number which must be added to 1728 to make it a perfect square is

.....

- (1) 36
- (2) 32

(3) 38

(4) 30

Solution:1

$$(1) 41 \times 41 = 1681$$

$$42 \times 42 = 1764$$

\therefore Required answer

$$= 1764 - 1728$$

$$= 36$$

4. For a triangle ABC, D and E are two points on AB and AC such that $AD = \frac{1}{4} AB$, $AE = \frac{1}{4} AC$. If $BC = 12$ cm, then DE is

(1) 5 cm

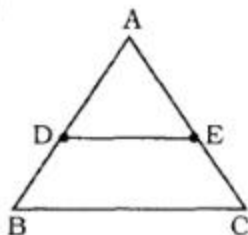
(2) 4 cm

(3) 3 cm

(4) 6 cm

Solution:3

(3)



$$\frac{AD}{AE} = \frac{AB}{AC}$$

$$\Delta ADE \sim \Delta ABC$$

$$\therefore DE = \frac{1}{4} BC$$

$$= \frac{1}{4} \times 12 = 3 \text{ cm}$$

5. If $\tan \theta + \cot \theta = 2$ then the value of θ is

- (1) 45°
- (2) 60°
- (3) 90°
- (4) 30°

Solution:

$$(1) \tan \theta + \cot \theta = 2$$

$$\Rightarrow \tan \theta + \frac{1}{\tan \theta} = 2$$

$$\Rightarrow \frac{\tan^2 \theta + 1}{\tan \theta} = 2$$

$$\Rightarrow \tan^2 \theta + 1 = 2 \tan \theta$$

$$\Rightarrow \tan^2 \theta - 2 \tan \theta + 1 = 0$$

$$\Rightarrow (\tan \theta - 1)^2 = 0$$

$$\Rightarrow \tan \theta - 1 = 0$$

$$\Rightarrow \tan \theta = 1 = \tan 45^\circ$$

$$\Rightarrow \theta = 45^\circ$$

6. The term to be added to $121a^2 + 64b^2$ to make a perfect square is

- (1) $176ab$
- (2) $276a^2b$
- (3) $178ab$
- (4) $188b^2a$

Solution:

$$(1) 121a^2 + 64b^2$$

$$= (11a)^2 + (8b)^2$$

$$\therefore (x + y)^2 = x^2 + y^2 + 2xy$$

$$\therefore \text{Required expression}$$

$$= 2 \times 11a \times 8b$$

$$= 176ab$$

7. A can do a piece of work in 6 days, B in 10 days and C in 15 days. They jointly

complete the work and earn 300. The sum of their wages for 2 days is

- (1) 180
- (2) 200
- (3) 160
- (4) 120

Solution:2

(2) (A + B + C)'s 1 day's work

$$= \frac{1}{6} + \frac{1}{10} + \frac{1}{15} = \frac{5+3+2}{30} = \frac{1}{3}$$

Hence, the work will be completed in 3 days.

∴ Their 2 days' wages
= Rs. 200

8. A sum of ₹ 76 is divided among A, B and C in such a way that A gets 7 more than what B gets and B gets 6 more than what C gets. The ratio of their shares is

- (1) 19 : 24 : 33
- (2) 32 : 25 : 19
- (3) 32 : 24 : 20
- (4) 19 : 25 : 33

Solution:2

(2) B's share = Rs. b

A's share = Rs. $(b + 7)$

C's Share = Rs. $(b - 6)$

$$\therefore b + b + 7 + b - 6 = 76$$

$$\Rightarrow 3b = 76 - 1 = 75$$

$$\Rightarrow b = \text{Rs. } 25$$

$$\therefore \text{A's share} = 25 + 7 = \text{Rs. } 32$$

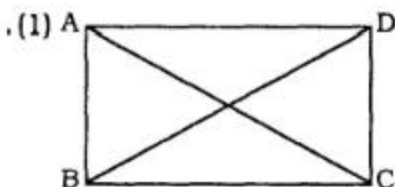
$$\text{C's share} = 25 - 6 = \text{Rs. } 19$$

$$\therefore \text{Required ratio} = 32 : 25 : 19$$

9. If the opposite sides of a quadrilateral and also its diagonals are equal, then each of the angles of the quadrilateral is

- (1) 90°
- (2) 120°
- (3) 100°
- (4) 60°

Solution:1



$$AB = CD$$

$$BC = AD$$

$$AC = BD$$

It will be a rectangle and each angle will be a right angle.

10. If $\cos \pi x = x^2 - x + \frac{5}{4}$,

the value of x will be

- (1) 0
- (2) 1
- (3) -1
- (4) None of the above

Solution:4

$$(4) \cos \pi x = x^2 - x + \frac{5}{4}$$

$$= x^2 - 2 \cdot x \cdot \frac{1}{2} + \frac{1}{4} - \frac{1}{4} + \frac{5}{4}$$

$$= \left(x - \frac{1}{2}\right)^2 + 1 > 1$$

$$-1 \leq \cos x \leq 1$$

11. A tank 40 m long, 30 m broad and 12 m deep is dug in a field 1000 m long and 30 m wide. By how much will the level of the field rise if the earth dug out of the tank is evenly spread over the field ?

- (1) 2 metre
(2) 1.2 metre
(3) 0.5 metre
(4) 5 metre

Solution:3

(3) Volume of earth taken out

$$= 40 \times 30 \times 12$$

$$= 14400 \text{ cu. metre}$$

Area of the rectangular field

$$= 1000 \times 30 = 30000 \text{ sq. metre}$$

Area of the region of tank

$$= 40 \times 30 = 1200 \text{ sq. metre}$$

Remaining area

$$= 30000 - 1200$$

$$= 28800 \text{ sq. metre}$$

Increase in level

$$= \frac{14400}{28800} = 0.5 \text{ metre}$$

12. In a triangle, if orthocentre, circumcentre, incentre and centroid coincide, then the triangle must be
- (1) obtuse angled
(2) isosceles
(3) equilateral
(4) right-angled

Solution:3

(3) In an equilateral triangle, orthocentre, circum-centre, in-centre and centroid coincide.

13. If $a = 2 + \sqrt{3}$, then the value of

$$\left(a^2 + \frac{1}{a^2}\right) \text{ is}$$

- (1) 12
 (2) 14
 (3) 16
 (4) 10

Solution:2

$$(2) a = 2 + \sqrt{3} ,$$

$$\frac{1}{a} = \frac{1}{2 + \sqrt{3}} = \frac{1}{(2 + \sqrt{3})} \times \frac{2 - \sqrt{3}}{(2 - \sqrt{3})}$$

$$= \frac{2 - \sqrt{3}}{4 - 3} = 2 - \sqrt{3}$$

$$\therefore a^2 + \frac{1}{a^2} = \left(a + \frac{1}{a}\right)^2 - 2$$

$$= (2 + \sqrt{3} + 2 - \sqrt{3})^2 - 2$$

$$= 16 - 2 = 14$$

14. For what value (s) of k the expression

$$p + \frac{1}{4}\sqrt{p} + k^2$$

is a perfect square ?

$$(1) \pm \frac{1}{3}$$

$$(2) \pm \frac{1}{4}$$

$$(3) \pm \frac{1}{8}$$

$$(4) \pm \frac{1}{2}$$

Solution:3

$$(3) \quad p + \frac{1}{4}\sqrt{p} + k^2$$

$$= (\sqrt{p})^2 + 2 \cdot \sqrt{p} \cdot \frac{1}{8} + \left(\frac{1}{8}\right)^2 - \left(\frac{1}{8}\right)^2 + k^2$$

$$\Rightarrow k^2 = \left(\frac{1}{8}\right)^2 \Rightarrow k = \pm \frac{1}{8}$$

15. If 15% of x is same as 20 % of y then x: y is

$$(1) 4 : 3$$

$$(2) 5 : 4$$

$$(3) 6 : 5$$

$$(4) 3 : 4$$

Solution:1

$$(1) \quad x \times \frac{15}{100} = y \times \frac{20}{100}$$

$$\Rightarrow x \times 15 = y \times 20$$

$$\Rightarrow \frac{x}{y} = \frac{20}{15} = \frac{4}{3}$$

16. If

$$\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$$

and $a - b + c \neq 0$ then which one of the following relations is true ?

$$(1) \frac{1}{c} = \frac{1}{a} + \frac{1}{b}$$

$$(2) \frac{1}{a} = \frac{1}{b} + \frac{1}{c}$$

$$(3) \frac{1}{b} = \frac{1}{a} - \frac{1}{c}$$

$$(4) \frac{1}{b} = \frac{1}{a} + \frac{1}{c}$$

Solution:3

$$(3) \frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$$

$$\Rightarrow \frac{b-c}{a} + \frac{a-b}{c} + \frac{a+c}{b} - 1 = 0$$

$$\Rightarrow \frac{b-c}{a} + \frac{a-b}{c} + \frac{a+c-b}{b} = 0$$

$$\Rightarrow \frac{c-b}{a} + \frac{b-a}{c} = \frac{a+c-b}{b}$$

$$\Rightarrow \frac{c^2 - bc + ab - a^2}{ac} = \frac{a+c-b}{b}$$

$$\Rightarrow \frac{(c^2 - a^2) - (bc - ab)}{ac} = \frac{a+c-b}{b}$$

$$\Rightarrow \frac{(c-a)(c+a) - b(c-a)}{ac}$$

$$= \frac{a+c-b}{b}$$

$$\Rightarrow \frac{(c-a)(c+a-b)}{ac} = \frac{a+c-b}{b}$$

$$\Rightarrow \frac{c-a}{ac} = \frac{1}{b}$$

$$\Rightarrow \frac{a}{ac} - \frac{a}{ac} = \frac{1}{b}$$

$$\Rightarrow \frac{1}{a} - \frac{1}{c} = \frac{1}{b}$$

17. A train crosses a platform in 30 seconds travelling with a speed of 60 km/h. If the length of the train be 200 metres, then the length (in metres) of the platform is
- (1) 400
 - (2) 300
 - (3) 200
 - (4) 500

Solution:2

(2) Speed of train = 60 kmph

$$= \left(60 \times \frac{5}{18} \right) \text{ m/sec.}$$

$$= \frac{50}{3} \text{ m/sec.}$$

If the length of platform be

= x metre, then

Speed of train

$$= \frac{\text{Length of (train + platform)}}{\text{Time taken in crossing}}$$

$$\Rightarrow \frac{50}{3} = \frac{200 + x}{30}$$

$$\Rightarrow 50 \times 10 = 200 + x$$

$$\Rightarrow x = 500 - 200 = 300 \text{ metre}$$

18. If ΔFGH is isosceles and $FG < 3$ cm, $GH = 8$ cm, then of the following, the true relation is.

- (1) $GH = FH$
- (2) $GF = GH$
- (3) $FH > GH$
- (4) $GH < GF$

Solution:1

$$= \frac{50}{3} \text{ m/sec.}$$

If the length of platform be

= x metre, then

Speed of train

$$= \frac{\text{Length of (train + platform)}}{\text{Time taken in crossing}}$$

$$\Rightarrow \frac{50}{3} = \frac{200 + x}{30}$$

$$\Rightarrow 50 \times 10 = 200 + x$$

$$\Rightarrow x = 500 - 200 = 300 \text{ metre}$$

19. The numerical value of

$$1 + \frac{1}{\cot^2 63^\circ} - \sec^2 27^\circ$$

$$+ \frac{1}{\sin^2 63^\circ} - \operatorname{cosec}^2 27^\circ \text{ is}$$

- (1) 1
- (2) 2
- (3) -1
- (4) 0

Solution:4

$$\begin{aligned}
 (4) \quad & 1 + \frac{1}{\cot^2 63^\circ} - \sec^2 27^\circ + \\
 & + \frac{1}{\sin^2 63^\circ} - \operatorname{cosec}^2 27^\circ \\
 & = 1 + \tan^2 63^\circ - \sec^2 27^\circ \\
 & \quad + \operatorname{cosec}^2 63^\circ - \operatorname{cosec}^2 27^\circ \\
 & = 1 + \tan^2 (90^\circ - 27^\circ) - \sec^2 27^\circ \\
 & \quad + \operatorname{cosec}^2 (90^\circ - 27^\circ) - \operatorname{cosec}^2 27^\circ \\
 & = 1 + \cot^2 27^\circ - \sec^2 27^\circ \\
 & \quad + \sec^2 27^\circ - \operatorname{cosec}^2 27^\circ \\
 & = 1 + \cot^2 27^\circ - \operatorname{cosec}^2 27^\circ \\
 & = 1 - 1 = 0
 \end{aligned}$$

$$[\because \operatorname{cosec}^2 \theta - \cot^2 \theta = 1]$$

20. A and B together can complete a job in 8 days. Both B and C, working alone can finish the same job in 12 days. A and B commence work on the job, and work for 4 days, whereupon A leaves. B continues for 2 more days, and then he leaves too. C now starts working, and finishes the job. How many days did C require ?

- (1) 5
(2) 8
(3) 3
(4) 4

Solution:4

(4) Work done by A and B in first 6 days

= (A + B)'s 4 days' work + B's 2 days' work

$$= 4 \times \frac{1}{8} + \frac{2}{12}$$

$$= \frac{1}{2} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}$$

Remaining work

$$= 1 - \frac{2}{3} = \frac{1}{3}$$

∴ Time taken by C

$$= \frac{1}{3} \times 12 = 4 \text{ days}$$

21. If $x = \sqrt{3} + \sqrt{2}$ then the value of

$$x^3 - \frac{1}{x^3} \text{ is}$$

- (1) $10\sqrt{2}$
- (2) $14\sqrt{2}$
- (3) $22\sqrt{2}$
- (4) $8\sqrt{2}$

Solution:3

$$(3) x = \sqrt{3} + \sqrt{2}$$

$$\begin{aligned}
 \therefore \frac{1}{x} &= \frac{1}{\sqrt{3}+\sqrt{2}} = \frac{\sqrt{3}-\sqrt{2}}{(\sqrt{3}+\sqrt{2})(\sqrt{3}-\sqrt{2})} \\
 &= \frac{\sqrt{3}-\sqrt{2}}{3-2} = \sqrt{3}-\sqrt{2} \\
 \therefore x - \frac{1}{x} &= \sqrt{3} + \sqrt{2} - \sqrt{3} + \sqrt{2} \\
 &= 2\sqrt{2} \\
 \therefore x^3 - \frac{1}{x^3} &= \left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right) \\
 &= (2\sqrt{2})^3 + 3 \times 2\sqrt{2} \\
 &= 16\sqrt{2} + 6\sqrt{2} = 22\sqrt{2}
 \end{aligned}$$

22. What is the product of the roots of the equation $x^2 - \sqrt{3} = 0$?

(1) $+\sqrt{3}$

(2) $\sqrt{3} \ i$

(3) $-\sqrt{3} \ i$

(4) $-\sqrt{3}$

Solution:4

$$(4) x^2 - \sqrt{3} = 0$$

$$\Rightarrow x^2 - (3)^{\frac{1}{2}} = 0$$

$$\Rightarrow x^2 - \left(3^{\frac{1}{4}}\right)^2 = 0$$

$$\Rightarrow \left(x + 3^{\frac{1}{4}}\right)\left(x - 3^{\frac{1}{4}}\right) = 0$$

$$\therefore x = 3^{\frac{1}{4}} \text{ or } -3^{\frac{1}{4}}$$

\therefore Product of roots

$$= 3^{\frac{1}{4}} \times -3^{\frac{1}{4}} = -\sqrt{3}$$

Note : Product of the roots of

$$ax^2 + bx + c = 0 \text{ is } \frac{c}{a}$$

\therefore Product of the roots of

$$x^2 - b.0 - \sqrt{3} = 0 \text{ is } -\sqrt{3}$$

23. If $x = \frac{\cos \theta}{1 - \sin \theta}$, then $\frac{\cos \theta}{1 + \sin \theta}$ is equal to

(1) $x - 1$

(2) $\frac{1}{x}$

(3) $\frac{1}{x+1}$

(4) $\frac{1}{1-x}$

Solution:2

(2)

$$x = \frac{\cos \theta}{1 - \sin \theta} = \frac{\cos \theta(1 + \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)}$$

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

$$= \frac{\cos \theta(1 + \sin \theta)}{\cos^2 \theta}$$

$$= \frac{1 + \sin \theta}{\cos \theta}$$

$$\therefore \frac{\cos \theta}{1 + \sin \theta} = \frac{1}{x}$$

24. On what sum of money will the difference between S.I and C.I for 2 years at 5% per annum be equal to 25 ?

(1) 10,000

(2) 10,500

(3) 9,500

(4) 9000

Solution:1

$$(1) \text{ Difference} = \frac{PR^2}{10000}$$

$$\Rightarrow 25 = \frac{P \times 5 \times 5}{10000}$$

$$\Rightarrow P = \text{Rs. } 10000$$

25. In ΔABC , $\angle B = 90^\circ$ and $AB: BC = 2 : 1$. The value of $\sin A + \cot C$ is

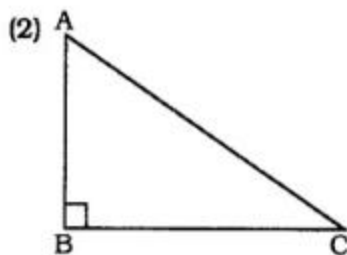
(1) $3 + \sqrt{5}$

(2) $\frac{2 + \sqrt{5}}{2\sqrt{5}}$

(3) $2 + \sqrt{5}$

(4) $3\sqrt{5}$

Solution:2



$$\frac{AB}{BC} = \frac{2}{1}$$

$$\Rightarrow AB = 2k, BC = k$$

$$\therefore AC = \sqrt{(2k)^2 + k^2} = \sqrt{5k^2}$$

$$= \sqrt{5}k$$

$$\therefore \sin A + \cot C = \frac{BC}{AC} + \frac{BC}{AB}$$

$$= \frac{k}{\sqrt{5}k} + \frac{k}{2k}$$

$$= \frac{1}{\sqrt{5}} + \frac{1}{2} = \frac{2 + \sqrt{5}}{2\sqrt{5}}$$

26. Anand marks up the price of an article by 50% and then allows a discount of 20% and sells it to Balaji. Balaji sells it for 720 more than what he purchased for, this S.P is 30% more than the original C.P of the article. Then Balaji's profit % is

- (1) 7.5%
- (2) 6.66%
- (3) 8.33%
- (4) 9%

Solution:3

$$\text{Selling price} = \frac{3x}{2} \times \frac{80}{100}$$

$$= \text{Rs. } \frac{6x}{5}$$

For Balaji,

$$\text{Cost price} = \text{Rs. } \frac{6x}{5}$$

(3) For Anand,

$$\text{Cost price} = \text{Rs. } x$$

$$\text{Marked price} = \text{Rs. } \frac{3}{2}x$$

$$\text{Selling price} = \text{Rs. } \left(\frac{6x}{5} + 20 \right)$$

$$\therefore \frac{6x}{5} + 20 = \frac{x \times 130}{100}$$

$$\Rightarrow \frac{13x}{10} - \frac{6x}{5} = 20$$

$$\Rightarrow \frac{13x - 12x}{10} = 20$$

$$\Rightarrow \frac{x}{10} = 20$$

$$\Rightarrow x = \text{Rs. } 200$$

\therefore Required gain percent

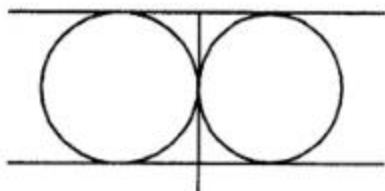
$$= \frac{20}{\frac{6x}{5}} \times 100$$

$$= \frac{20 \times 5 \times 100}{6 \times 200} = \frac{25}{3} = 8.33\%$$

27. The minimum number of common tangents drawn to two circles when both the circles touch each other externally is

- (1) 1
- (2) 2
- (3) 3

(4) 0

Solution:3**(3)**

28. If out of 10 selected students for an examination, 3 were of 20 years, age, 4 of 21 and 3 of 22 years, the average age of the group is

- (1) 22 years
- (2) 21 years
- (3) 21.5 years
- (4) 20 years

Solution:2

. (2) Average age of the whole group

$$= \frac{3 \times 20 + 4 \times 21 + 3 \times 22}{10}$$

$$= \frac{60 + 84 + 66}{10} = \frac{210}{10}$$

$$= 21 \text{ years}$$

29. A cistern normally takes 10 hours to be filled by a tap. But because of a leak, it takes 2 hours more. In how many hours will the leak empty a full cistern ?

- (1) 45
- (2) 48
- (3) 30
- (4) 60

Solution:4

(4) Part of the tank filled by

$$\text{pipe in 1 hour} = \frac{1}{10}$$

With leakage part filled in 1

$$\text{hour} = \frac{1}{12}$$

\therefore Part emptied in 1 hour by leakage

$$= \frac{1}{10} - \frac{1}{12} = \frac{6-5}{60} = \frac{1}{60}$$

\therefore Required time

$$= 60 \text{ hours}$$

30. You arrive at your school 5 minutes late if you walk with a speed of 4 km/h, but you arrive 10 minutes before the scheduled time if you walk with a speed of 5 km/h. The distance of your school from your house (in km) is

- (1) 4
- (2) 5
- (3) 10
- (4) 2

Solution:2

. (2) If the required distance be x km, then

$$\frac{x}{4} - \frac{x}{5} = \frac{10+5}{60}$$

$$\Rightarrow \frac{5x - 4x}{20} = \frac{1}{4}$$

$$\Rightarrow \frac{x}{20} = \frac{1}{4}$$

$$\Rightarrow x = \frac{1}{4} \times 20 = 5 \text{ km.}$$

31. If a, b, c, d, e are five consecutive odd numbers, their average is

(1) $5(a + 4)$

(2) 5

(3) $5(a + b + c + d + e)$

(4) $a + 4$

Solution:4

(4) Numbers : $a,$

$$b = a + 2$$

$$c = a + 4$$

$$d = a + 6$$

$$e = a + 8$$

\therefore Required average

$$= \frac{a + a + 2 + a + 4 + a + 6 + a + 8}{5}$$

$$= \frac{5a + 20}{5} = \frac{5(a + 4)}{5} = a + 4$$

If $x - \frac{1}{x} = 1$, then the value of

32. $\frac{x^4 - \frac{1}{x^2}}{3x^2 + 5x - 3}$ is

(1) $\frac{1}{4}$

(2) $\frac{1}{2}$

(3) $\frac{3}{4}$

(4) 0

Solution:2

$$\therefore (2) \text{ Expression} = \frac{x^4 - \frac{1}{x^2}}{3x^2 + 5x - 3}$$

Dividing numerator and denominator by x ,

$$= \frac{x^3 - \frac{1}{x^3}}{3x + 5 - \frac{3}{x}} = \frac{x^3 - \frac{1}{x^3}}{3\left(x - \frac{1}{x}\right) + 5}$$

$$= \frac{\left(x - \frac{1}{x}\right)^3 + 3\left(x - \frac{1}{x}\right)}{3\left(x - \frac{1}{x}\right) + 5}$$

$$= \frac{1+3}{3+5} = \frac{4}{8} = \frac{1}{2}$$

33. If $\sin \frac{\pi x}{2} = x^2 - 2x + 2$, then

the value of x is

- (1) 0
- (2) 1
- (3) -1
- (4) None of these

Solution:2

$$(2) \sin \frac{\pi x}{2} = x^2 - 2x + 2$$

Putting $x = 1$

$$\sin \frac{\pi}{2} = 1 - 2 + 2 = 1$$

34. The value of

$$\frac{\sin 43^\circ}{\cos 47^\circ} + \frac{\cos 19^\circ}{\sin 71^\circ} - 8 \cos^2 60^\circ \text{ is}$$

(1) 0

(2) 1

(3) 2

(4) -1

Solution:

(1) Expression

$$\frac{\sin 43^\circ}{\cos 47^\circ} + \frac{\cos 19^\circ}{\sin 71^\circ} - 8 \cos^2 60^\circ$$

$$= \frac{\sin 43^\circ}{\cos(90^\circ - 43^\circ)} + \frac{\cos 19^\circ}{\sin(90^\circ - 19^\circ)} - 8 \times \left(\frac{1}{2}\right)^2$$

$$= \frac{\sin 43^\circ}{\sin 43^\circ} + \frac{\cos 19^\circ}{\cos 19^\circ} - 8 \times \frac{1}{4}$$

$$[\sin(90^\circ - \theta) = \cos \theta;$$

$$\cos(90^\circ - \theta) = \sin \theta]$$

$$= 1 + 1 - 2 = 0$$

35. Which is the largest of the following fractions ?

$$\frac{2}{3}, \frac{3}{5}, \frac{8}{11}, \frac{11}{17}$$

(1) $\frac{8}{11}$

(2) $\frac{3}{5}$

(3) $\frac{11}{17}$

(4) $\frac{2}{3}$

Solution:1

(1) $\frac{2}{3} = 0.66$

$\frac{3}{5} = 0.6$

$\frac{8}{11} = 0.73$

$\frac{11}{17} = 0.65$

36. A shopkeeper marks his goods 40% above the cost price. He allows a discount of 596 for cash payment to his customers. He receives 21064 after paying the discount. His profit is

(1) 264

(2) 164

(3) 200

(4) 800

Solution:1