GATE 2015

Mechanical Engineering

▶ **General Aptitude (Question with Solution Set-1, 2 & 3)**

SET-1

1. What is the adverb for the given word below?
Misogynous

A. Misogynousness B. Misogynity

C. Misogynously D. Misogynous

Ans. C

Sol. Misogynous(adjective) and it describes a person who characterized by hatred of women.
adverb form: Misogynously.

2. Ram and Ramesh appeared in an interview for two vacancies in the same department. The probability of Ram's selection is 1/6 and that of Ramesh is 1/8. What is the probability that only one of them will be selected?

A. $\dfrac{47}{48}$ B. $\dfrac{1}{4}$

C. $\dfrac{13}{48}$ D. $\dfrac{35}{48}$

Ans. B

Sol. Let the probability of Ram selected in interview P(A) = 1/6

Probability of Ramesh selected in interview P(B)= 1/8

There is two vacancies in the company then the probability that only one of them will be selected=

P(A) x P(B') + P(A') x P(B) = $\left(\dfrac{1}{6}\times\dfrac{7}{8}\right)+\left(\dfrac{1}{8}\times\dfrac{5}{6}\right)$

$\Rightarrow \dfrac{12}{48}=\dfrac{1}{4}$

3. Choose the appropriate word/phrase, out of the four options given below, to complete the following sentence: Dhoni, as well as the other team members of Indian team, _____ present on the occasion.

A. was B. has

C. have D. were

Ans. A

Sol. When a singular noun or pronoun is connected with another noun or pronoun by using words like **with, as well as, besides, together with, no less than** and other similar expressions, the verb is singular.

4. An electric bus has onboard instruments that report the total electricity consumed since the start of the trip as well as the total distance covered. During a single day of operation, the bus travels on stretches M, N, O and P, in that order. The cumulative distances travelled and the corresponding electricity consumption are shown in the table below

Stretch	Comulative distance(km)	Electricity used (kWh)
M	20	12
N	45	25
O	75	45
P	100	57

The stretch where the electricity consumption per km is minimum is

A. M B. N

C. O D. P

Ans. D

Sol.

Stretch	Cumulative Distance	Electricity Used (kWh)	Individual Distance (km)	Individual Electricity (kWh)	kWh/km
M	20	12	20	12	12/20=0.6
N	45	25	25	13	13/25=0.52
O	75	45	30	20	20/30=0.66
P	100	57	25	12	12/25=0.48

Conclusion: P has the minimum ratio.

5. Choose the word most similar in meaning to the given word: Awkward

A. Inept   B. Graceful

C. Suitable   D. Dreadful

Ans. A

Sol. Inept: not able to do something well.

Graceful: having a smooth, attractive movement.

Suitable: appropriate for something or somebody.

Dreadful: very bad and unpleasant. awkward means difficult to deal with or unsuitable and a synonym of "inept".

6. In the following sentence certain parts are underlined and marked P, Q and R. One of the parts may contain certain error or may not be acceptable in standard written communi-cation. Select the part containing an error. Choose D as your answer: if there is no error.

The student corrected

$\underset{P}{\underline{\text{all the errors}}}$ that $\underset{Q}{\underline{\text{the instructor marked}}}$

on the $\underset{R}{\underline{\text{answer book}}}$

A. P   B. Q

C. R   D. No Error

Ans. B

Sol. Since the first sentence happened after the second one, and the first one is in the simple past tense, the second should be in the past perfect tense.

So, part Q has an error. it should be "that the instructor had marked"

Correct sentence- " The student corrected all the errors that **the instructor had marked** on the **Ans.** book."

7. Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows.

Statement:

I. All film stars are playback singers.

II. All film directors are film stars.

Conclusions:

I. All film directors are playback singers.

II. Some film stars are film directors.

A. Only conclusion I follows

B. Only conclusion II follows

C. Neither conclusion I nor II follows

D. Both conclusions I and II follow

Ans. D

Sol. Possible ven diagram from the given statement is given below:

From the given ven diagram we can say that: All film directors are playback singers. Some film stars are film directors. SO, both conclusions follow the given statement.

8. Lamenting the gradual sidelining of the arts in school curricula, a group of prominent artists wrote to the Chief Minister last year, asking him to allocate more funds to support arts education in schools. However, no such increase has been announced in this year's Budget. The artists expressed their deep anguish at their request not being approved, but many of them remain optimistic about funding in the future.

Which of the statement(s) below is/are logically valid and can be inferred from the above statements?

i. The artists expected funding for the arts to increase this year.

ii. The Chief Minister was receptive to the idea of increasing funding for the arts.

iii. The Chief Minister is a prominent artist.

iv. Schools are giving less importance to arts education nowadays.

A. iii and iv   B. i and iv

C. i, ii and iv   D. i and iii

Ans. B

Sol. There is no mention that the Chief Minister was a prominent artist and receptive to increasing funding for the arts. This makes statements (ii) and (iii) wrong. Therefore, options A, C and D are incorrect. (contain one of these options). The remaining option B is our answer.

Let's see other statements too. "the gradual sidelining of the arts in school curricula" indicates that Schools are giving less importance to arts education nowadays. So, statement (iv) is right.

"many of them remain optimistic about funding in the future" indicates that The artists expected funding for the arts to increase this year. So, statement (i) is right. Hence option B is the right answer.

9. If $a^2 + b^2 + c^2 = 1$ then $ab + bc + ac$ lies in the interval

A. $\left[1, \frac{2}{3}\right]$ B. $\left[\frac{-1}{2}, 1\right]$

C. $\left[-1, \frac{1}{2}\right]$ D. $\left[2, -4\right]$

Ans. B

Sol. We know that the square of any number must be grater or equal to zero

$(a + b + c)2 \geq 0$

$a^2 + b^2 + c^2 + 2(ab + bc + ca) \geq 0$

$1 + 2 (ab + bc + ca) \geq 0$

$ab + bc + ca \geq -1/2$

Similarly,

$(a - b)^2 + (b - c)^2 + (c - a)^2 \geq 0$

$2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ca \geq 0$

$a^2 + b^2 + c^2 - ab - bc - ca \geq 0$

$1 - ab - bc - ca \geq 0$

$Ab + bc + ca \leq 1$

So, the answer is $[-1/2, 1]$

10. A tiger is 50 leaps of its own behind a deer. The tiger takes 5 leaps per minute to the deer's 4. If the tiger and the deer cover 8 metre and 5 metre per leap respectively, what distance in meters will the tiger have a run before it catches the deer?

A. 800   B. 600

C. 500   D. 450

Ans. A

Sol. Tiger – 1 leap $\Rightarrow$ 8 meter

Speed = 5 leap/min = 40 m/min

Deer $\rightarrow$ 1 leap = 5 meter

speed = 4 leap/min = 20 m/min

Let the tiger catches the deer after time 't'.

$\therefore$ distance covered by tiger = Distance travelled by deer + initial distance between them.

$40 \times t = 20t + 50 \times 8$

$40t = 20t + 400$

$t = 400/20 = 20$ min

total distance that tiger have to cover in time "t" = 40t = 40 x 20 = 800ms
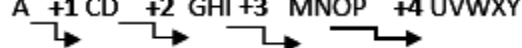
SET-2

1. Find the missing sequence in the letter series below:

   A, CD, GHI, ? , UVWXY

   A. LMN   B. MNO

   C. MNOP   D. NOPQ

Ans. C

Sol.

2. Choose the correct verb to fill in the blank below: Let us _____.

   A. Introvert   B. alternate

   C. atheist   D. altruist

Ans. B

Sol. Let us is always followed by a verb. Here introvert, altruist and atheist are nouns. So, the correct answer would be B.

3. Choose the most appropriate word from the options given below to complete the following sentence? If the athlete had wanted to come first in the race, he _____several hours every day.

   A. Should practice

   B. Should have practiced

   C. Practised

   D. Should be practicing

Ans. B

Sol.

if-clause	main clause
Simple Present	will-future or (Modal + infinitive)
Simple Past	would/should+ infinitive
Past Perfect	would/should + have + past participle

The tense used in the first half of the sentence is in past perfect, so should have practiced is the correct choice.

4. Choose the most suitable one-word substitute for the following expression Connotation of a road or way

   A. Pertinacious   B. Viaticum

   C. Clandestine   D. Ravenous

Ans. B

Sol. Pertinacious-persistent

   viaticum- means the Eucharist (Christian service, ceremony, or sacrament commemorating the Last Supper) as given to a person near or in danger of death. provisions or a travel allowance for a journey.

   clandestine- kept secret or done secretively

   Ravenous-extremely hungry.

   In the question, it is given that, (Connotation of a road or way) A connotation is an associated or secondary meaning of a word or expression than its literal meaning.

   So, out of the given options, option B is the closest one.

5. If $x>y>1$, which of the following must be true?

   (i) $\ln x > \ln y$ (ii) $e^x > e^y$

   (iii) $Y^x > X^y$ (iv) $\cos x > \cos y$

   A. (i) and (ii)   B. (i) and (iii)

   C. (iii) and (iv)   D. (ii) and (iv)

Ans. A

Sol. For whole numbers, $x>y$,

   $\ln x > \ln y$

   $e^x > e^y$

because log and exponential functions are monotonically increasing functions.

So, option 1 is the correct answer.

For (iii) $Y^x > X^y$

let take $X = 3$ and $Y = 2$

$y^x = 8$ and $x^y = 9$ and $8 < 9$

So, $Y^x > X^y$ not always true.

(iv) $\cos x > \cos y$

let take $X = 90^0$ and $Y = 0^0$

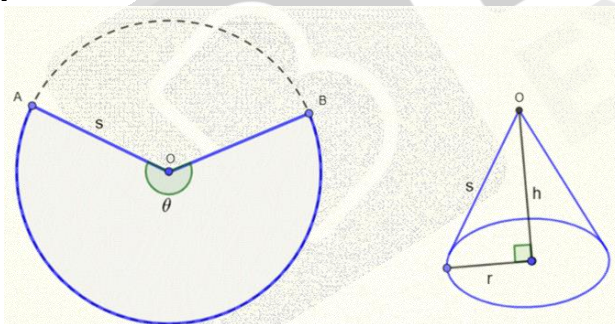$\cos x = \cos 90 = 0$ and $\cos y = \cos 0 = 1$

This equate $\cos x < \cos y$

So, $\cos x > \cos y$ is not always right

6. From a circular sheet of paper of radius 30cm, a sector of 10% area is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and height of the cone is _____.

A. 1.57　　　　　　B. 3.08

C. 2.06　　　　　　D. 1.67

Ans. C

Sol.

Here we know that after folding the slant height(l) of the cone is equal to the radius of the circular sheet(s).

So, $l = s = 30$

The area removed from the circular sheet = 10%

So, Leftover 90% of area of sheet = Curved surface area of cone

$\Rightarrow 0.9 \times \pi \times 30 \times 30 = \pi \times r \times l$

$\Rightarrow 900 \times 0.9 = 30\, r$

$\Rightarrow r = 27$

Now, in cone we know that $l^2 = r^2 + h^2$

$30^2 = 27^2 + h^2$

$h = 13.08$

Then $r/h = 27/13.08 = 2.06$

7. In the following question, the first and the last sentence of the passage are in order and numbered 1 and 6. The rest of the passage is split into 4 parts and numbered as 2,3,4, and 5. These 4 parts are not arranged in proper order. Read the sentences and arrange them in a logical sequence to make a passage and choose the correct sequence from the given options.

1) One Diwali, the family rises early in the morning.

2) The whole family, including the young and the old enjoy doing this,

3) Children let off fireworks later in the night with their friends.

4) At sunset, the lamps are lit and the family performs various rituals

5) Father, mother, and children visit relatives and exchange gifts and sweets.

6) Houses look so pretty with lighted lamps all around.

A. 2, 5, 3, 4　　　　B. 5, 2, 4, 3

C. 3, 5, 4,2　　　　D. 4, 5, 2, 3

Ans. B

Sol. 3) "Children let off their fireworks later in the night with their friends".

4) "At sunset, the lamps are lit, and the family performs various rituals".

Night comes after sunset. So, sentence 3 comes after 4.

2) The whole family, including the young and the old, enjoy doing this. Here 'This' indicates that it comes after the sentence where the action has happened and has mentioned the whole family.

5) Father, mother, and children visit relatives and exchange gifts and sweets. It mentioned the whole family and some action; therefore, sentence 2 comes after 5.

So, the correct order will be 5−2−4−3. So option B is the correct answer.

8. Ms. X will be in Vadodra from 01/05/2014 to 20/05/2014 and from 22/05/2014 to 31/05/2014. On the morning of 21/05/2014, she will reach Kochi via Mumbai Which one of the statements below is logically valid and can be inferred from the above sentences?

A. Ms. X will be in Kochi for one day, only in May

B. Ms. X will be in Kochi for only one day in May

C. Ms. X will be only in Kochi for one day in May

D. Only Ms. X will be in Kochi for one day in May

Ans. B

Sol. As, it is given that Ms. X on morning of 21/05/2014 will reach Kochi and on 22/05/2014 she has to be in Mumbai, hence option 2 would be correct answer.

9. log tan1° + log tan2° + ... + log tan89° is ....

A. 1   B. $1/\sqrt{2}$

C. 0   D. −1

Ans. C

Sol. Take first and last term

log tan1° + log tan89°

= log (tan1° × tan89°)

[log tanA+log tanB= log(tanA×tanB)]

= log (tan1° × cot1°) [cot1= 1/tan1]

= log1

= 0

so all complementary angle becomes zero as (89,1) (88,2)........(46,44)

Only tan 45° is left,

log (tan 45°) = log1 = 0

Therefore, total sum is zero.

10. Ram and Shyam shared a secret and promised to each other that it would remain between them. Ram expressed himself in one of the following ways as given in the choices below. Identify the correct way as per standard English.

A. It would remain between you and me.

B. It would remain between I and you

C. It would remain between you and I

D. It would remain with me

Ans. A

Sol. Since two persons are in conversation correct verb should be you and me, so option 1 is the correct answer.

SET-3

1. Five teams have to compete in a league, with every team playing every other team exactly once, before going to the next round. How many matches will have to be held complete the league round of matches?

A. 20   B. 10

C. 8   D. 5

Ans. B

Sol. For a match to be played, we need 2 teams L No of matches = no. of ways of selections 2 teams out of 5

$= {}^5c_2 = 10$

2. Tanya is older than Eric.

Cliff is older than Tanya.

Eric is older than Cliff.

If the first two statements are true, then the third statement is

A. True   B. False

C. Uncertain   D. Data insufficient

Ans. B

Sol. Because the first two statements are true, Eric is the youngest of the three, so the third statement must be false

3. Choose the appropriate word/phase, out of the four options given below, to complete the following sentence:

Apparent lifelessness _____ dormant life.

A. harbours   B. lead to

C. supports   D. affects

Ans. A

Sol. Apparent: looks like

lifelessness: a state of no emotion or movement.

dormant: the period in an organism's life cycle when physical and emotional activity is temporarily stopped.

Harbour:

(I) give shelter to hide.

(II) An emotional thought or secret you have in your mind over a period of time.

Effect (verb): results in

So, from the given options harbours fitted as best that emotionless and motionless life provides a shelter to dormant life.

4. Choose the statement where underlined word is used correctly.

A. When the teacher eludes to different authors, he is being elusive

B. When the thief keeps eluding the police, he is being elusive

C. Matters that are difficult to understand, identify or remember are allusive

D. Mirages can be allusive, but a better way to express them is illusory

Ans. B

Sol. Elusive: Difficult to answer.

5. Fill in the blank with the correct idiom/phrase.

That boy from the town was a _____ in the sleepy village.

A. Dog out of herd

B. Sheep from the heap

C. Fish out of water

D. Bird from the flock

Ans. C

Sol. From the statement, it appears that boy found it tough to adapt to a very different situation. Fish out of the water means A person away from his or her usual habitat or surroundings. From the given options "fish out of water" has the same sense of meaning.

6. Right triangle PQR is to be constructed in the xy – plane so that the right angle is at P and line PR is parallel to the axis. The x and y coordinates of P, Q, and R are to be integers that satisfy the inequalities: $-4 \leq x \leq 5$ and $6 \leq y \leq 16$. How many different triangles could be constructed with these properties?

A. 110   B. 1,100

C. 9,900   D. 10,000

Ans. C

Sol. We have the rectangle with dimensions 10*11 (10 horizontal dots and 11 vertical). PQ is parallel to the y-axis and PR is parallel to the x-axis.

Choose the (x,y) coordinates for vertex P (right angle): $^{10}C_1 \times {}^{11}C_1$;

Choose the x coordinate for vertex R (as y coordinate is fixed by P): $^{9}C_1$, (10-1=9 as 1 horizontal dot is already occupied by P);

Choose the y coordinate for vertex Q (as x coordinate is fixed by P): $^{10}C_1$, (11-1=10 as 1 vertical dot is already occupied by P).

$^{10}C_1 \times {}^{11}C_1 \times {}^{9}C_1 \times {}^{10}C_1 = 9900$.

7. Select the appropriate option in place of underlined part of the sentence. <u>Increased productivity necessary</u> reflects greater efforts made by the employees.

A. Increase in productivity necessary

B. Increase productivity is necessary

C. Increase in productivity necessarily

D. No improvement required

Ans. C

Sol. Here "Necessary" comes before the verb "reflects" so it should be an adverb.

Necessary:- Adjective

Necessarily:- Adverb

Option C is right.

8. Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows:

Statements:

I. No manager is a leader.
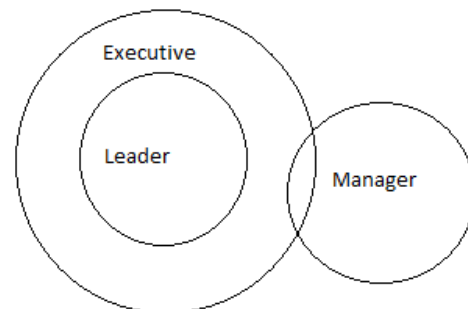
II. All leaders are executive.

Conclusions:

I. No manager is a executive.

II. All executive is a manager.

A. Only conclusion I follows.

B. Only conclusion II follows.

C. Neither conclusion I nor II follows.

D. Both conclusion I and II follow.

Ans. C

Sol.

From the ven diagram,

we can see that some managers can be executives so the first conclusion is wrong. We also see that not all executives are manager so the second conclusion is also wrong.

Therefore, Neither conclusion I nor II follows.

9. A coin is tossed thrice. Let X be the event that head occurs in each of the first two tosses. Let Y be the event that a tail occurs on the third toss. Let Z be the event that two tails occurs in three tosses. Based on the above information, which one of the following statements is TRUE?

A. X and Y are not independent

B. Y and Z are dependent

C. Y and Z are independent

D. X and Z independent

Ans. B

Sol. X event in which head occurs in the first two tosses

X = {HHH}, {HHT} P(X)=2/8 = 1/4

Y event in which a tail occurs on the third toss

Y = {HHT}, {HTT}, {THT}, {TTT} P(Y) = 4/8 = 1/2

Z event in which two tails occur in three tosses

Z = {HTT}, {THT}, {TTH} P(Z) = 3/8

Two events A and B, are independent if and only if P(A∩B) **= P(A)P(B)**. = P(A). Thus, if two events A and B are independent and P(B)≠0, then P(A|B) = P(A)

In the above question P(X∩Y) =1/8   only event {HHT} is common.

P(Y∩Z) = 2/8 = 1/4 two event {HTT}, {THT} are common

P(X∩Z) = 0 no event is common

P(X|Y) = P(X∩Y)/P(Y) = 1/4,
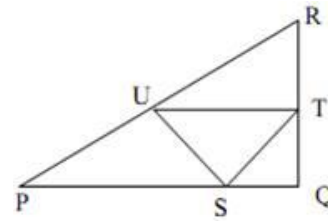
which is equal to P(X); hence X and Y are independent.

P(X|Z) = P(X∩Z)/P(Z) = 0 not equal to P(X), Hence X and Z are dependent.

P(Y|Z) = P(Y∩Z)/P(Z) = 2/3 not equal to P(Y), hence Y and Z are dependent.

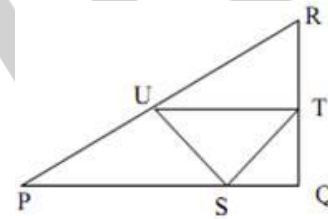From the given options, only option B, as Y and Z are dependent, is true.

10. In the given figure angle Q is a right angle, PS:QS = 3:1, RT:QT = 5:2 and PU:UR = 1:1. If area of triangle QTS is 20 cm², then the area of triangle PQR in cm² is ____

A. 275   B. 270

C. 260   D. 280

Ans. D

Sol.

Let area of triangle PQR be 'A'

$$\frac{SQ}{PQ} = \frac{1}{1+3} = \frac{1}{4}$$

$$\frac{QT}{QR} = \frac{2}{2+5} = \frac{2}{7}$$

∴ Ara of Δ^{le} QTS $= \frac{1}{2} \times SQ \times QT$

$$= \frac{1}{2} \times \left(\frac{1}{4} PQ \right) \times \left(\frac{2}{7} QR \right)$$

$$= \frac{1}{4} \times \frac{2}{7} \times \left(\frac{1}{2} \times PQ \times QR \right)$$

$$= \frac{1}{14} \times \text{ Area of } \Delta^{le} \text{ PQR}$$

Given that the area of triangle QST is 20cm² hence 20cm² = A × 1/14

A =14 × 20= 280cm²

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