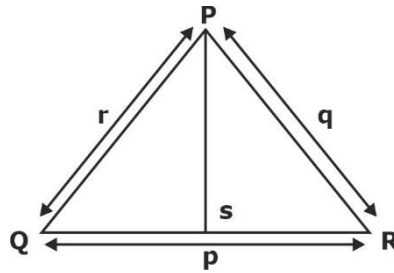# GATE 2016

Electrical Engineering

General Aptitude

Question Paper
& Solutions

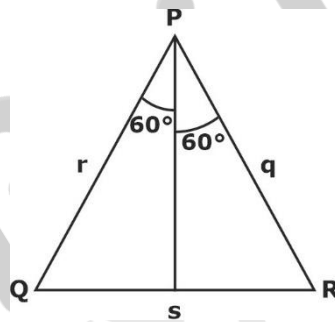**1.** In a triangle PQR, PS is the angle bisector of $\angle QPR$ and $\angle QPS = 60°$. What is the length of PS?

A. $\dfrac{(q+r)}{qr}$

B. $\dfrac{qr}{(q+r)}$

C. $\sqrt{(q^2 + r^2)}$

D. $\dfrac{(q+r)^2}{qr}$

[2016 : 2 Marks, Set-2]

Ans. B

Sol.

In $\Delta PQR \Rightarrow Ar\Delta PQR = Ar(\Delta QPS) + Ar(\Delta PSR)$

$\dfrac{1}{2}r \times q \times \sin 120°$

$= \dfrac{1}{2}r \times PS \times \sin 60° + \dfrac{1}{2}q \times PS \sin 60°$

$\dfrac{1}{2}r \times q \times \sin(180 - 60°) = \dfrac{1}{2}PS \sin 60° (r + q)$

$\dfrac{1}{2}r \times q \times \sin 60° = \dfrac{1}{2}PS \times \sin 60° (r + q)$

$PS = \left[\dfrac{r \times q}{r + q} \right]$

2. In a quadratic function, the value of the product of the roots (α, β) is 4. Find the value of

$\dfrac{\alpha^n + \beta^n}{\alpha^{-n} + \beta^{-n}}$

A. n^4 B. 4^n

C. 2.2^{n-1} D. 4^{n-1}

[2016 : 1 Mark, Set-1]

Ans. B

Sol. $\dfrac{\alpha^n + \beta^n}{\alpha^{-n} + \beta^{-n}} = \dfrac{\alpha^n + \beta^n}{\dfrac{1}{\alpha^n} + \dfrac{1}{\beta^n}} = \dfrac{\alpha^n + \beta^n}{\left(\dfrac{\beta^n + \alpha^n}{\alpha^n \beta^n}\right)} = (\alpha\beta)^n$
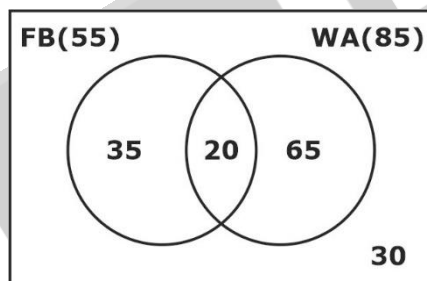
given, $\alpha \times \beta = 4$

Hence, $(\alpha\beta)^n = 4^n$

3. Among 150 faculty members in an institute, 55 are connected with each other through Facebook® and 85 are connected through WhatsApp®. 30 faculty members do not have Facebook® or WhatsApp® accounts. The number of faculty members connected only through Facebook® accounts is _____ .

A. 35   B. 45

C. 65   D. 90

[2016 : 2 Marks, Set-1]

Ans. A
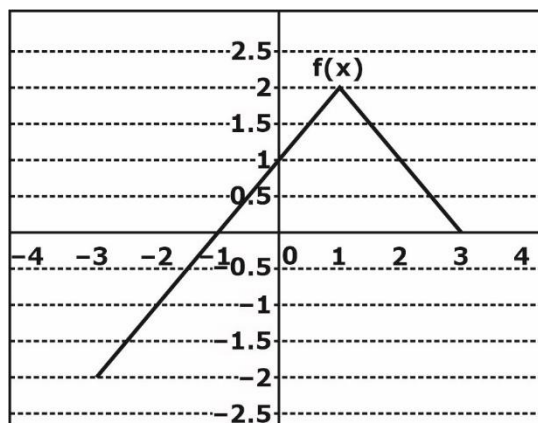
Sol.

Following Venn diagram can be drawn as

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$120 = 55 + 85 - n(A \cap B)$

$n(A \cap B) = 20$

so only Facebook is 35.

4. Choose the correct expression for f(x) given in the graph.

A. $f(x) = 1 - |x - 1|$ B. $f(x) = 1 + |x - 1|$
C. $f(x) = 2 - |x - 1|$ D. $f(x) = 2 + |x - 1|$

[2016 : 2 Marks, Set-1]

Ans. C

Sol. From the given graph,

At x = 3, f(x) must be equals to zero.

For option A:

 $f(x) = 1 - |x - 1|$

 $f(3) = 1 - |3 - 1| = 1 - 2 = -1$

Therefore, option A is incorrect.

For option B:

 $f(x) = 1 + |x - 1|$

 $f(3) = 1 + |3 - 1| = 1 + 2 = 3$

Therefore, option B is not correct.

For option C:

 $f(x) = 2 - |x - 1|$

 $f(3) = 2 - |3 - 1| = 2 - 2 = 0$

Hence, option C is correct.

For option D:

f(x) = 2 + |x − 1|

f(3) = 2 + |3 − 1| = 2 + 2 = 4

Hence, option D is incorrect.

5. If $|9y − 6| = 3$, then $y^2 - \dfrac{4y}{3}$ is _____.

A. Zero

B. $+\dfrac{1}{3}$

C. $-\dfrac{1}{3}$

D. undefined

[2016 : 1 Mark, Set-2]

Ans. C

Sol. $|9y − 6| = 3$

⇒ Either (9y − 6 = 3) or (9y − 6 = −3)

⇒ $[y = 1]$ or $\left[y = \dfrac{1}{3} \right]\left[y^2 - \dfrac{4y}{3} \right]$

Put $\quad y = \dfrac{1}{3}, \left(\dfrac{1}{3} \right)^2 - \dfrac{4}{3} \times \dfrac{1}{3} = -\dfrac{1}{3} \text{ or } y^2 - \dfrac{4y}{3}$

Put $\quad y = 1, 1^2 - \dfrac{4}{3} = -\dfrac{1}{3}$

6. Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

A. 0.2508

B. 0.2816

C. 0.2934

D. 0.6000

[2016 : 2 Marks, Set-2]

Ans. A

Sol. Probability of free throw

$= \dfrac{60}{100} = 0.6$

Probability of NOT free throw = 1 − 0.6 = 0.4

So required probability of exactly 6 throws in 10 attempts will be given by

$^{10}C_6 (0.6)^6 \times (0.4)^4 = 0.2508$

7. The numeral in the unit's position of

$211^{870} + 146^{127} \times 3^{424}$ is _____.

A. 9   B. 7

C. 5   D. 8

Ans. B

Sol. $211^{870} + 146^{127} \times 3^{424}$

Unit digit in 211^{870} is 1, because the cyclicity of 1 is always 1.

Unit digit in 146^{127} is 6, because the cyclicity of 6 is always 6.

Unit digit in 3^{424} is 1, because the cyclicity of 3 is 4 and 424/4 = 106, i.e., completely divisible.

Hence, the unit digit of $211^{870} + (146^{127} \times 3^{424})$ is

$= 1 + (6 \times 1) = 7$

Hence, option B is correct.

8. The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is _____.

A. 130   B. 120

C. 110   D. 140

Ans. B

Sol. From the graph, large plants are 1, 4, 8, 9 which are having installed capacity of at least 200 tonnes.

Total production of large plant is

[160 + 190 + 230 + 190] = 770

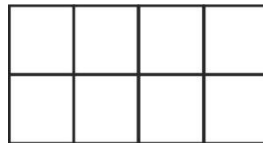Remaining plant number 2, 3, 5, 6, 7 all are small plants with capacity less than 200 tonnes.

Total production of small plants

= 150 + 160 + 120 + 100 + 120 = 650

Difference = 770 – 650 = 120

Hence, option B is correct.

9. In a 2 × 4 rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid?

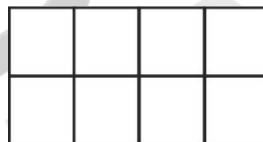A. 21   B. 27

C. 30   D. 36

[2016 : 2 Marks, Set-1]

Ans. C

Sol. Number of rectangles will be

$^5C_2 \times {}^3C_2$

10 × 3 = 30

As whenever any two horizontal and any two vertical lines are chosen their intersection will produce a rectangle.

10. Pick the odd one out in the following:

13, 23, 33, 43, 53

A. 23   B. 33

C. 43   D. 53

[2016 : 1 Mark, Set-1]

Ans. B

Sol. 13, 23, 43, 53 are all prime number.

Only 33 is composite 33, (11 × 3).

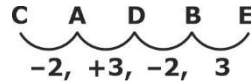Odd one out is 33.

11. Pick the odd one from the following options.

    A. CADBE   B. JHKIL

    C. XVYWZ   D. ONPMQ

[2016 : 1 Mark, Set-2]

Ans. D

Sol.

Same patterns follow in all options A, B, C only (D) doesn't follow this pattern, Hence odd number out (D).

12. R2D2 is a robot. R2D2 can repair aeroplanes. No other robot can repair aeroplanes. Which of the following can be logically inferred from the above statements?

    A. R2D2 is a robot which can only repair aeroplanes.

    B. R2D2 is the only robot which can repair aeroplanes.

    C. R2D2 is a robot which can repair only aeroplanes.

    D. Only R2D2 is a robot.

[2016 : 1 Mark, Set-2]

Ans. B

Sol. R2D2 is a robot who can repair aeroplanes and no other robot can do this work. The function of R2D2 is not known and thus inference 1 does not follow.

We do not know whether R2D2 can repair anything else other than aeroplanes. Thus, option C does not follow.

Hence, The statement 'No other robot can repair aero planes' means R2D2 is the only robot which can repair aero planes, so option (B) is the best inference.

13. The man who is now Municipal Commissioner worked as _____ .

    A. the security guard at a university

    B. a security guard at the university

    C. a security guard at university

    D. the security guard at the university

[2016 : 1 Mark, Set-1]

Ans. B

Sol. The reference is to a particular person who worked as a security guard.

Hence, the correct option is (B).

14. Nobody knows how the Indian cricket team is going to <u>cope with</u> the difficult and seamer-friendly wickets in Australia. Choose the option which is closest in meaning to the underlined phrase in the above sentence.

A. put up with   B. put in with

C. put down to   D. put up against

[2016 : 1 Mark, Set-1]

Ans. A

Sol. The closest meaning to cope with is put up with which means to tolerate. Cope with does not mean to place someone into competition with someone else. Hence, option A is correct.

15. Find the odd one in the following group of words. mock, deride, praise, jeer

A. mock   B. deride

C. praise   D. jeer

[2016 : 1 Mark, Set-1]

Ans. C

Sol. 'mock, deride and jeer' are synonyms which means mockery. Therefore, the odd one is 'praise'. Hence, option C is correct.

16. Computers were invented for performing only high-end useful computations. However, it is no understatement that they have taken over our world today. The internet, for example, is ubiquitous. Many believe that the internet itself is an unintended consequence of the original invention. With the advent of mobile computing on our phones, a whole new dimension is now enabled. One is left wondering if all these developments are good or, more importantly, required.

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

(i) the author believes that computers are not good for us.

(ii) Mobile computers and the internet are both intended inventions

A. (i) only   B. (ii) only

C. both (i) and (ii)   D. neither (i) nor (ii)

[2016 : 2 Marks, Set-1]

Ans. D

Sol. Author has not said anything against internet and mobile computing but is talking about the surprising usage of these.

"Many believe that the internet itself is an unintended consequence of the original invention."

The author says that many believe that 'internet itself' is unplanned but actually, both internet and mobile computers are unplanned (unintended) inventions.

17. All hill-stations have a lake. Ooty has two lakes. Which of the statement(s) below is/are logically valid and can be inferred from the above sentences?

(i) Ooty is not a hill-station.

(ii) No hill-station can have more than one lake.

A. (i) only   B. (ii) only

C. both (i) and (ii)   D. neither (i) nor (ii)

[2016 : 2 Marks, Set-1]

Ans. D

Sol. Statement (i) is not true because Ooty is a hill station due Ooty has two lakes statement(ii) is also not true, because in given statements, for hill station one lake is compulsory but not mentioned about number of lakes. Hence, option D is correct.

18. The chairman requested the aggrieved shareholders to _____ him.

A. bare with   B. bore with

C. bear with   D. bare

[2016 : 1 Mark, Set-2]

Ans. C

Sol. Bare with - invitation to undress, thus not appropriate here.

Bore with - past tense of bear with

e.g., He bore with me for twenty minutes as I searched for the information he wanted, but then he could stand it no longer and he hung up the phone.

Bear with - request for patience or tolerance appropriate in this context and hence correct answer.

Bare - Bare is an adjective and is defined as lacking the usual or appropriate covering or clothing. This is not suitable in this context.

19. Identify the correct spelling out of the given

options:

A. Managable   B. manageable

C. mangaeble   D. managible

[2016 : 1 Mark, Set-2]

Ans. B

Sol. 'manageable' is the correct spelling. Hence, option B is correct.

20. A poll of students appearing for master's in engineering indicated that 60 of the students believed that mechanical engineering is a profession unsuitable for women. A research study on women with masters or higher degrees in mechanical engineering found that 99% of such women were successful in their professions.

Which of the following can be logically inferred from the above paragraph?

A. Many students have misconceptions regarding various engineering disciplines.

B. men with advanced degrees in mechanical engineering believe women are well suited to be mechanical engineers.

C. Mechanical engineering is a profession well suited for women with masters or higher degrees in mechanical engineering.

D. The number of women pursuing higher degrees in mechanical engineering is small.

[2016 : 2 Marks, Set-2]

Ans. C

Sol. A poll says that women with masters or higher degrees in mechanical engineers are successful in their professions. This statement leads to the option 'C' which is the best inference.

21. Sourya committee had proposed the establishment of Sourya Institutes of Technology (SITs) in line with Indian Institutes of Technology (IITs) to cater to the technological and industrial needs of a developing country.
Which of the following can be logically inferred from the above sentence?
Based on the proposal,
(i) In the initial years, SIT students will get degrees from IIT.
(ii) SITs will have a distinct national objective.
(iii) SIT like institutions can only be established in consultation with IIT.
(iv) SITs will serve technological needs of a developing country.
A. (iii) and (iv) only   B. (i) and (iv) only
C. (ii) and (iv) only   D. (ii) and (iii) only

[2016 : 2 Marks, Set-2]

Ans. C

Sol. Option (i) and (iii) state phrases like 'in the initial years' and 'SIT like institutions can only be established in consultation with IIT' cannot be logically inferred so (ii) and (iv) are the best inferences i.e., option (C).