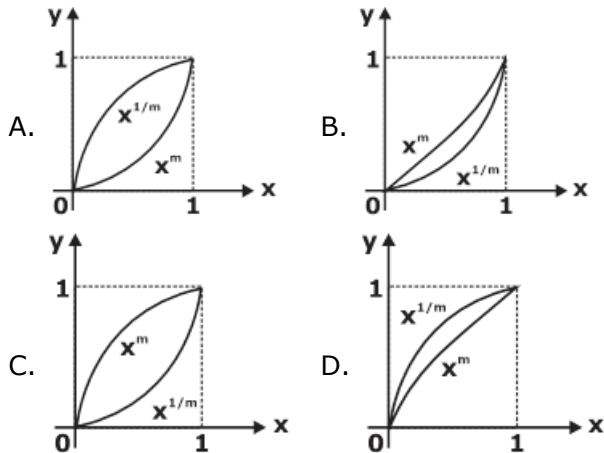# GATE 2020

Mechanical Engineering

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

SET-1

1. Select the graph that schematically represents BOTH $y = x^m$ and $y = x^{1/m}$ properly in the interval $0 \le x \le 1$, for integer values of m, where, m>1

A.

B.

C.

D.

Ans. A

Sol. Put m = 2, so $y = x^2$ and $y = x^{\frac{1}{2}}$

And x= 0.5

$Y = x^m = 0.5^2 = 0.25$

$y = x^{1/m} = 0.5^{0.5} = 0.707$

So, the graph for $x^{1/m}$ will be above than the x^m

Satisfy option C

2. The sum of the first n terms in the sequence 8, 88, 888, 8888, … is____.

A. $\dfrac{81}{80}(10^n - 1) + \dfrac{9}{8}n$

B. $\dfrac{80}{81}(10^n - 1) + \dfrac{8}{9}n$

C. $\dfrac{80}{81}(10^n - 1) - \dfrac{8}{9}n$

D. $\dfrac{81}{80}(10^n - 1) - \dfrac{9}{8}n$

Ans. C

Sol. Sum of first n term is

= 8 + 88 + 888 + 8888 + ……

= 8[1 + 11 + 111 + 1111 + ……]

$= \dfrac{8}{9}[9 + 99 + 999 + 9999 + ...]$

$= \dfrac{8}{9}[(10 - 1) + (10^2 - 1) + (10^3 - 1) + (10^4 - 1)]$

$= \dfrac{8}{9}[10 + 10^2 + 10^3 + 10^4......n]$

$= \dfrac{8}{9}[10 + 10^2 + 10^3 + 10^4......n - (1 + 1......n)]$

$= \dfrac{8}{9}\left[10 \cdot \dfrac{(10^n - 1)}{10 - 1} - n\right]$

$= \dfrac{80}{81}(10^n - 1) - \dfrac{8}{9}n$

3. P, Q, R and S are to be uniquely coded using α and β. If P is coded as αα and Q as αβ, then R and S, respectively, can be coded as

A. αβ and ββ   B. ββ and αα

C. βα and ββ   D. βα and αβ

Ans. C

Sol. Given that P, Q, R and S are to be uniquely coded using α and β. It means the values of P, Q, R and S should be different. So all possible different codes formed with α and β are:

αβ, βα, αα, ββ

Here P is coded as αα and Q is coded as αβ

Then the remaining codes as βα and ββ must be for R and S.

From the given options, only option C shows this code. Hence it is the right answer.

4. Crowd funding deals with mobilisation of funds for a project from a large number of people, who would be willing to invest smaller amounts through web-based platforms in the project.

Based on the above paragraph, which of the following is correct funding?

A. Funds raised through unwilling contributions on web-based platforms.

B. Funds raised through voluntary contributions on web-based platforms.

C. Funds raised through coerced contributions on web-based platforms

D. Funds raised through large contributions on web-based platforms.

Ans. B

Sol. The paragraph says who would be **willing to investsmaller amounts** through web-based platforms in the project.
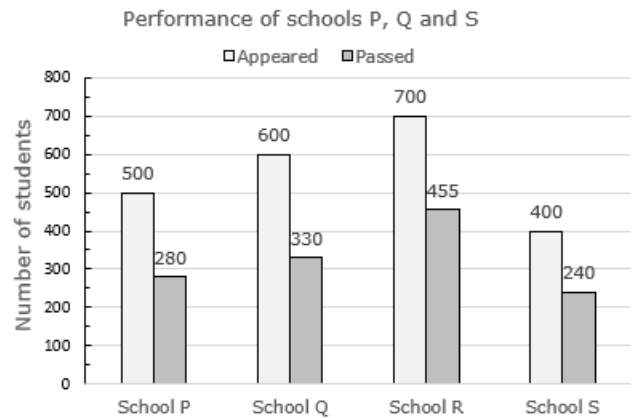
Option A talks about **unwilling contributions**, so it is False.

Option C talks about **coerced contributions** (means forceful contributions), so it is also false.

Option D talks about **large contributions** on web-based platforms, whereas the paragraph talks about smaller amounts, which is also false.

Option A talks about **voluntary contributions** (means done or given because of your will), same as given in the paragraph. Hence, it is the right answer.

5. The bar graph shows the data of the students who appeared and passed rates (in percentage) of these four schools P, Q, R and S. The average of success rates (in percentage) of these four schools is _____.

Performance of schools P, Q and S

☐ Appeared   ☐ Passed

	School P	School Q	School R	School S
Appeared	500	600	700	400
Passed	280	330	455	240

A. 58.8%   B. 58.5%

C. 59.0%   D. 59.3%

Ans. C

Sol. Sucess Rate (P) = $\frac{280}{500} \times 100 = 56\%$

Sucess Rate (Q) = $\frac{330}{600} \times 100 = 55\%$

Sucess Rate (R) = $\frac{455}{700} \times 100 = 65\%$

Sucess Rate (S) = $\frac{240}{400} \times 100 = 60\%$

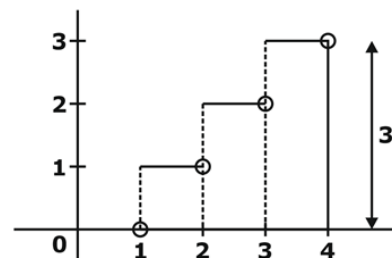Average Success Rate = $\frac{56 + 55 + 65 + 60}{4}$

= 59%

6. Define [x] as the greatest integer less than or equal to x, for each x ∈ (−∞, ∞), If y = [x], then area under y for x ∈ [1,4] is

A. 1   B. 3

C. 4   D. 6

Ans. D

Sol. y = [x]

Area under the curve y = [x].

Area = 1 × 1 + 1 × 2 + 1 × 3

= 1 + 2 + 3

= 6

7. Jofra Archer, the England fast bowler, is _____ than accurate.

A. less fast   B. more faster

C. more fast   D. faster

Ans. C

Sol. Jofra Archer, the England fast bowler, is more fast than accurate.

8. I do not think you know the case well enough to have opinions. Having said that, I agree with your other point.

What does the phrase "having said that" mean in the given text?

A. in addition to what I have said

B. despite what I have said

C. contrary to what I have said

D. as opposed to what I have said

Ans. B

Sol.

The phrase "Having said that" signs that they are going to say something which will contrast or disagree with what they said a moment ago.it means that **despite what I have said.** (turn back from the statement which was said just a moment ago).

Example: Their game has been fairly good. *Having said that*, there is still room for improvement.

9. He is known for his unscrupulous ways. He always sheds………… tears to deceive people.

A. crocodile's   B. fox's

C. fox   D. crocodile

Ans. D

Sol. The phrase **"Crocodile tears"** means - **a false, insincere display of emotion**, such as a hypocrite crying fake tears of grief.

Unscrupulous means being dishonest, cruel or unfair to get what you want.

Hence the complete sentence: He is known for his unscrupulous ways. He always sheds Crocodile tears to deceive people.

10. Select the word that fits the analogy:

Build : Building :: Grow : _____

A. Grown   B. Growed

C. Grew   D. Growth

Ans. D

Sol. Build : Building :: Grow : Growth "build" is a verb, and "building" is its noun form. Similarly, "grow." is a verb and "growth" is its noun form.

SET-2

1. While I agree _____ his proposal this time, I do not often agree _____ him.

A. to, to   B. with, with

C. with, to   D. to, with

Ans. D

Sol.

The phrase "agree with" means to agree with a person.

The phrase "agree to" is refers to agreeing with an idea or proposal.

So, the correct sentence: While I agree to his proposal this time, I do not often agree with him.

2. The recent measures to improve the output would _____ the level of production to our satisfaction.

A. speed   B. decrease

C. increase   D. equalize

Ans. C

Sol. The recent measures to improve the output would increase the level of production to our satisfaction.

3. Select the word that files the analogy:

White: Whitening :: Light: _____

A. Lighting   B. Enlightening

C. Lightening   D. Lightning

Ans. C

Sol. White is an adjective (colour) related to Whitening, which means making something white.

Similarly, light is also an adjective (not of great weight) related to lightening, which means to make something lighter by reducing in weight or quantity.

Other options meaning are given below:

Lightning means a giant spark of electricity in the atmosphere between clouds, the air, or the ground.

Lighting means the type of lights used in a room, building for illumination.

Enlightening means the state of having extreme knowledge or insight.

4. In one of the greatest innings ever seen in 142 years of Test history, Ben Stokes upped the tempo in a five-and-a-half hour long stay of 219 balls including 11 fours and 8 sixes that saw him finish on a 135 not out as England squared the five-match series.

Based on their connotations in the given passage, which one of the following meanings does not match?

A. tempo = enthusiasm

B. squared = lost

C. saw = resulted in

D. upped = increased

Ans. B

Sol. Ben Stokes **upped the tempo**. It means that he made the match very interesting and exciting and increased the interest in the game.

Enthusiasm means a strong feeling of excitement or interest in something. So, **Tempo** has connotations with **Enthusiasm** and **Upped** with **Increased.**

Saw him finish on a 135 not out as England squared the five-match series. This means that he played such a long inning and resulted in a series draw.

So, the saw has connotations with resulted in. England **squared** the five-match series. It means England **equalized or drew** the five-match series.

So, Squared means equalized or drew. But in the option lost is given. Hence it is the wrong option.

Question is asked about which one of the following meanings does not match. So, we choose option (B)

5. There are five levels {P,Q,R,S,T} in a linear supply chain before a product reaches customers, as shown in the figure.
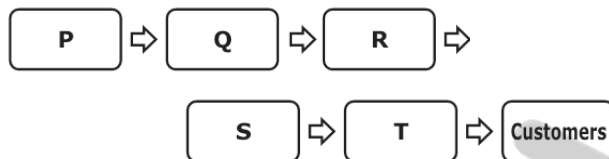
At each of the five levels, the price of the product is increased by 25%. If the product is produced at level P at the cost of Rs. 120 per unit, what is the price paid (in rupees) by the customers?

A. 234.38   B. 292.96

C. 187.50   D. 366.21

Ans. D

Sol. P → Q → R → S → T → Customers

Price paid by customer = $120 \times (1.25)^5$

= 366.21

6. Climate change and resilience deal with two aspects – reduction of non-renewable energy resources and reducing vulnerability of climate change aspects. The terms 'mitigation' and 'adaption' are used to refer to these aspects, respectively.

Which of the following assertions is best supported by the above information?

A. Mitigation deals with consequences of climate change.

B. Mitigation deals with actions taken to reduce the use of fossil fuels.

C. Adaptation deals with causes of climate change.

D. Adaptation deals with actions taken to combat green-house gas emissions.

Ans. B

Sol. Mitigation means the act of reducing the severity, seriousness, or painfulness of something.

Adaptation means the state or process of changing to suit a new situation.

With reference to the above paragraph **Mitigation** deals with actions taken to reducethe use of fossil fuels. **Adaptation** deals with reducing the vulnerability of climate change aspects. From the given option only option B is right.

7. An engineer measures THREE quantities X, Y and Z in an experiment. She finds that they follow a relationship that is represented in the figure below: (the product of X and Y linearly varies with Z).
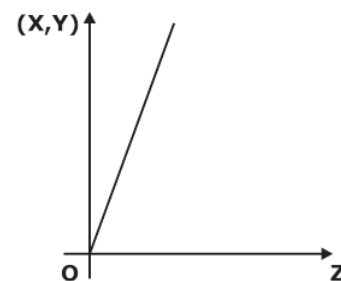
Then, which of the following statements is FALSE?

A. For fixed X; Z is proportional to Y

B. For fixed Z; X is proportional to Y

C. XY/Z is constant

D. For fixed Y; X is proportional to Z

Ans. B

Sol. The line passes through the origin

XY = mZ   (from the figure given in question)

Where m = slope of the line.

A. For fixed X, XY = mZ

$Y/Z = m/X$ (m/X is constant) $Y \propto Z$

It means Y is proportional to Z. Hence, option A is true.

B. For fixed Z, XY = mZ (mz=constant)

$X \propto 1/Y$ (it means X is inversely proportional to Y.)

So, option A is false.

C. Given that XY = mZ

$XY/Z = m$(constant)

So, option C is true.

D. For fixed Y,

$XY = mZ$ $X/Z = m/Y$(constant)

$X \propto Z$ (X is proportional to Z)

So, option D is true.

The question asked about the false one.

So, we choose option B.

8. It was estimated that 52 men can complete a strip in a newly constructed highway connecting cities P and Q in 10 days. Due to an emergency, 12 men were sent to another project. How many number of days, more than the original estimate, will be required to complete the strip?

A. 3 days   B. 10 days

C. 5 days   D. 13 days

Ans. A

Sol. Since MD = Constant

Where M = No. of men

D = No. of days for work

Initially $M_1 = 52$

$D_1 = 10$ days.

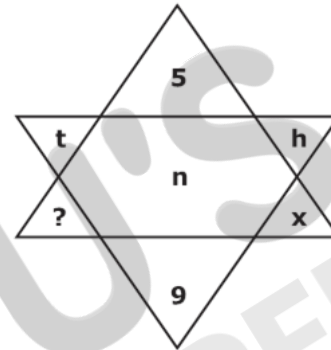Due to emergency, 12 men were sent. Thus, number of men remaining.

$M_2 = 52 - 12 = 40$

Now $52 \times 10 = 40 \times D_2$

$D_2 = 13$ days

No. of days, more than original estimate = 13-10

= 3 days

9. Find the missing element in the following figure.

A. y   B. e

C. w   D. d

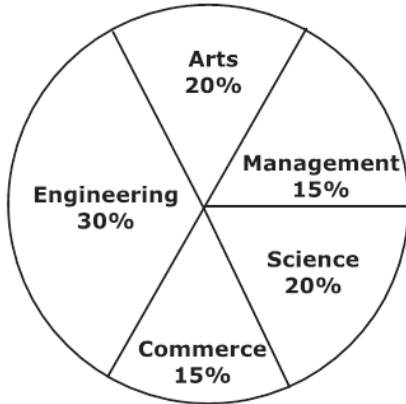**Ans.** D

Sol. Assume n = 4

5 + 4 = 9

Similarly, T = 20

x = t + n = 20 + 4

x = 24

similarly apply for the H = 8

unknown + 4 = H

unknown + 4 = 8

unknown = 4 = D

10. The two pie-charts given below show the data of total students and only girls registered in different streams in a university. If the total number of students registered in the university is 5000, and the total number of the registered girls is 1500; then the ratio of boys enrolled in Arts to the girls enrolled in Management is ____.

Percentage of students enrolled in different streams in a University

Percentage of girls enrolled in different streams
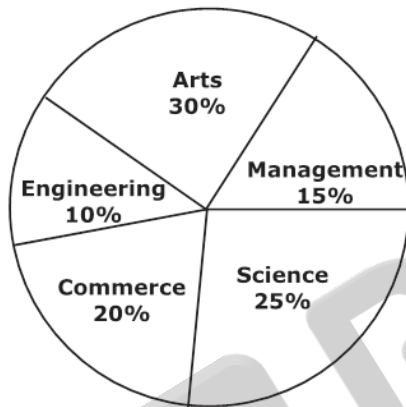
A. 11: 9 B. 9: 22

C. 2: 1 D. 22: 9

Ans. D

Sol. Total no. of students in the university = 5000

Total no. of girls = 1500

(Boys)$_{arts}$ = 0.2 × 5000 − 0.3 × 1500

= 550

(Girls)$_{management}$ = 0.15 × 1500

= 225

$$\frac{(Boys)_{Arts}}{(Girls)_{management}} = \frac{550}{225} = \frac{22}{9}$$

= 22:9

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