# GATE-2020

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## :- General Aptitude

Preposition

1⇒ Ramesh is confident of speaking English within six months as he has been practising regularly for the last three weeks.

D

for → Present Perfect continous tense

2⇒ His knowledge of the subject was excellent but his classroom performance was extreamly poor.

A

3⇒ Select the word that fits the analogy :-

A

Cook : Cook :: Fly : Flyer.

verb → Cook

noun → Flyer

★ cooks → cook , Flies → Flyer

④ → The dawn of the 21st century witnessed the melting glaciers oscillation b/w giving too much and too little to billions of people who depend on them for fresh water. The UN climate report estimates that without deep cuts to man-made ~~empi~~ emissions, at least 30% of the northern hemisphere's surface permafrost could melt by the end of the century. Given this situation of imminent global exodus of billions of people displaced by rising seas, nations states need to rethink their carbon footprint for political concerns, if not for environmental ones.

Which one of the following statements can be inferred from the given passage?

~~(D)~~ → Billions of people are affected by melting glaciers.

(5) ⇒ Cheapest route from node-1 to node-2 ⇒

(A) 1 —200→ a —200→ 2 ⟹ 400

1 —200→ a —100→ c —100→ 2 ⟹ 400

(C) 1 —300→ b —200→ 2 ⟹ 500 (X)

(D) 1 —100→ f —100→ e —200→ 2 ⟹ 400

(B) 1 —100→ f —0→ b —200→ 2 ⟹ 300

(6) ⇒ GST is an indirect tax introduced in India in 2017 that is imposed on the supply of goods and services, and it subsums all indirect taxes except few. It is a destination based tax imposed on goods & services used, and it is not imposed at the point of origin from where goods comes. GST also has a few components specific to state governments, central government and Union Territaries (UTs).

Which one of the following statements can be inferred from the given passage ?

(D) ⇒ GST is imposed at the point of usage of goods & services.

(7) → P = 3 , R = 27 , T = 243 , Q + S = ?

(C)

P = 3 = $3^1$

Q = 9 = $3^2$

R = 27 = $3^3$

S = 81 = $3^4$

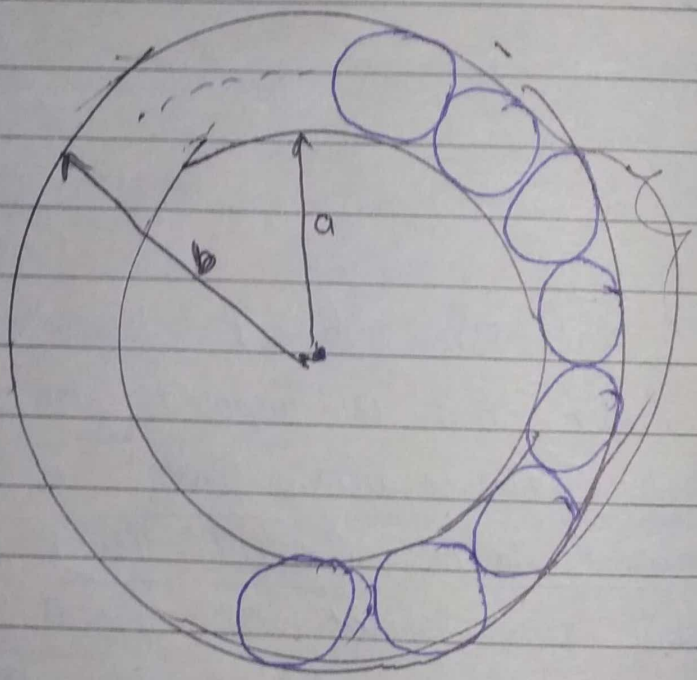
T = 243 = $3^5$

Q + S = 9 + 81

= 90 Ans

(8) →

(A)




Total outer area = $\pi b^2$

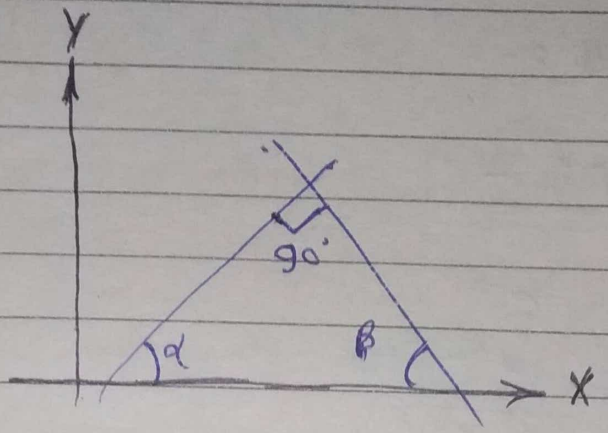
Total inner area = $\pi a^2$

Middle circle area = $\pi \left(\frac{b-a}{2}\right)^2$

Unpainted area = $(\pi b^2 - \pi a^2) - n\left(\frac{\pi (b-a)^2}{4}\right)$

(A) → Unpainted Area = $\pi\left[(b^2 - a^2) - \frac{n}{4}(b-a)^2\right]$

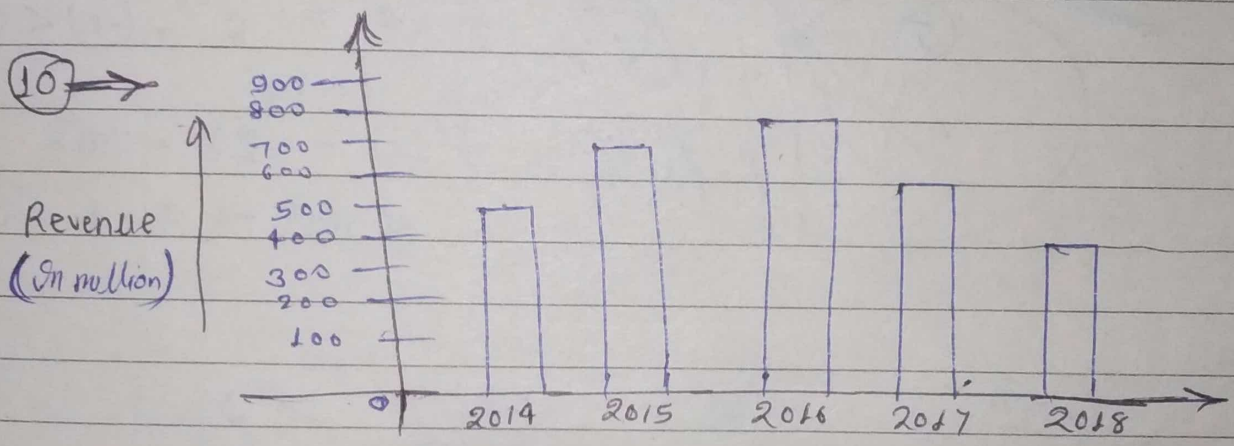
9 → B




$\alpha + \beta + 90^\circ = 180^\circ$

$\boxed{\alpha + \beta = 90^\circ}$

10 → C




Totatal expenditure = 5 x 500

= 2500 million.

Total Revenue = 500 + 700 + 800 + 600 + 400

= 3000 million

$\text{Profit} = \frac{3000 - 2500}{2500} \times 100 = \frac{500}{25}^{20}$

$\boxed{\text{Profit} = 20\ \%}$

## Section-B :-

(1) → $F^n$ –

(A)

(I) $e^{-x}$

(II) $x^2 - \sin x$

(III) $\sqrt{x^3+1}$

which $f^n$ increasing everywhere $[0,1]$ –

Sol$^n$

(I) ✗ (I) $f'(x) = e^{-x} \cdot (-1) < 0$

✗ (II) $f'(x) = 2x - \cos x$

at $x=0 \rightarrow 0 - 1 = -1 < 0$

(III) $f'(x) = \dfrac{3x^2}{\sqrt{x^3+1}} > 0.$

(A) → III only

(2) $T(n) = T(n^{1/a}) + 1$ | $T(b) = 1$

A

$T(n^{1/a}) = T(n^{1/a^2}) + 1$

$T(n) = T(n^{1/a^2}) + 2$

$T(n^{1/a^2}) + 1$

$T(n) = T(n^{1/a^3}) + 3$

$T(n) = T(n^{1/a^k}) + k$

$T(n^{1/a^k}) = T(b) = 1$

$n^{1/a^k} = b$

$a^k \log n = \log b$

$\log n = a^k \log_b$

$a^k = \log_b n$

$k \log a = \log(\log_b n)$

$k = \log_a(\log_b n)$

$\therefore T(b) + \log_a \log_b n = \Theta(\log_a \log_b n)$

(5) ⇒ Preorder traversal of BST 15, 10, 12, 11, 20, 18, 16, 19

Postorder = ?

(B)

Sol$^n$

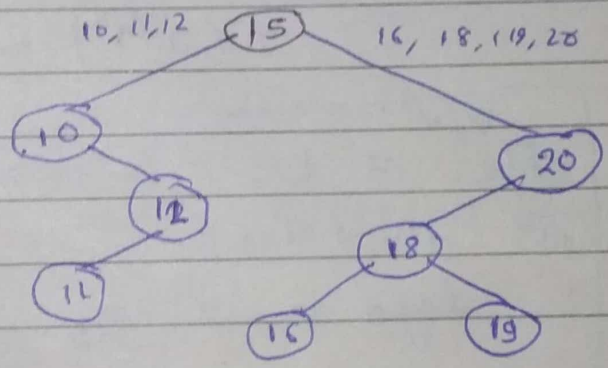
Preorder = R, Left, Right

Postorder = Left, Right, R

Inorder → Sorted order (Always)

↳ 10, 11, 12, 15, 16, 18, 19, 20

↑ Root




Postorder = 11, 12, 10, 16, 19, 18, 20, 15

(6) ⇒ Worst case time complexity of inserting $n^2$ element into AVL-tree with n-element initially?

(C)

$O(n^2 \log n)$

Every insertion of element = $\log n$

Find place to insert = $\log n$

if property not satisfy then rotate

$n^2 \log n$

$n^2$ element insert

7) Which RE represent set of all binary string with an odd no. of 1's ?

No option

Sol$^n$ (A) $((0+1)^*1(0+1)^*1)^*10^*$

→ generate ⇒ 1, 111, 01011 0, ----

→ can not generate ⇒ 001, 01, ---- X

(B) $(0^*10^*10^*)^*0^*1$

→ generate ⇒ 1, 1101, 0101001, ----

→ can not generate ⇒ 10, 100, ----

(C) $10^*(0^*10^*10^*)^*$

→ generate ⇒ 1, 1001010, ----

→ not generate ⇒ 01, 001, ----

(D) $(0^*10^*10^*)^*10^*$

→ generate ⇒ 1, 01110, ----

→ not generate ⇒ 01, 001, ----

8) (I) $L_1 \cup L_2$ is regular, then both $L_1$ & $L_2$ must be regular

(II) The class of regular languages is closed under infinite union.

D

Ex ⇒ (I) → $\{a^n b^n\} \cup \{a^n b^n\}^c = (a+b)^*$ → Regular

$\{a^n b^n\}$, $\{a^n b^n\}^c$ → not regular.

(II) → $a^n b^n = \{\varepsilon\} \cup \{ab\} \cup \{aabb\} \cup$ ---- → Regular

but $\{a^n b^n \mid n \geq 0\}$ → not regular