



GAMBITOR

ATHENOX

Details

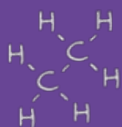
Name _____

Registration No. _____

Invigilator's Sign _____

$$(x+y)^n = \sum_{k=0}^n {}^nC_k x^{n-k} y^k$$

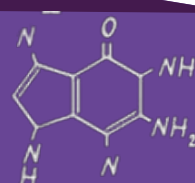
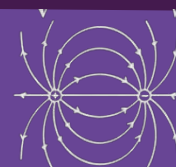
$$Y = X^2$$



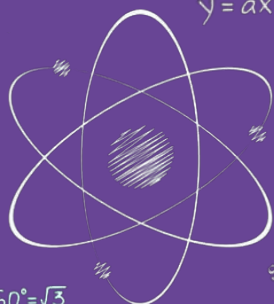
$$\lambda = vT$$

$$\tan 60^\circ = \sqrt{3}$$

$$y = ax^2 + bx + c$$



$$E = mc^2$$



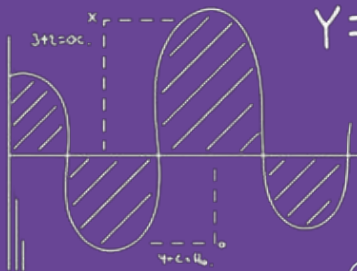
$$i_C = I_m \sin(\omega t + \frac{\pi}{2})$$

$$s = ut + \frac{1}{2}at^2$$

$$\left(\frac{a}{b}\right)^c = \frac{a^c}{b^c}$$

$$V_{ab} = I \sum (R + r) - \sum E$$

$$\sin(90^\circ - A) = \cos A$$



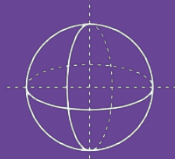
$$S = \frac{(v^2 - v_o^2)}{2a}$$

$$\eta = \frac{(Q_1 - Q_2)}{Q_1}$$

$$\tan 60^\circ = \sqrt{3}$$

$$\log_a 1 = 0$$

$$S = \frac{2\pi mv \cos \theta}{qB}$$



$$T = \frac{2\pi\sqrt{l}}{g}$$



$$\sin^2 y + \cos^2 y = 1$$

$$Y = X^2$$



$$\sin(90^\circ - A) = \cos A$$

Q1. There exists a line L and a point P , let's say we join all the points L_1, L_2, L_3, \dots which lie on line L to P and draw perpendicular bisectors to all the line L_1P, L_2P, \dots so on. There exists a curve C which is tangent to all those perpendicular bisectors.

Let the line L be $2x + y = 12$, and P be $(9, 4)$. 2 tangents at C are chosen at random and normal are drawn to them. Let A be another line $x - 2y = \phi$. Two triangles are formed, one by tangents and line A , and other by normals and line A . Let's say the ratio of their area is ' a '.

(A). Find the locus of point of intersection of tangent pairs for which $a = 1$ at $\phi = 1$.

(B). Find the condition on slopes of tangents such that.

(i) ' a ' is independent of ϕ

(ii) ' a ' depends on ϕ

20 Marks

Q2. The relation for the spectral black body emissive power $E_{b,T}$, was developed by Max Plank in 1901 in conjunction with his famous quantum theory.

$$E_{b,\lambda}(\lambda, T) = \frac{2\pi hc_0^2}{\lambda^5 [e^{(\frac{hc_0}{\lambda T})} - 1]}$$

Compute the total radiation per unit area for a black body.

Symbols denote their usual notation.

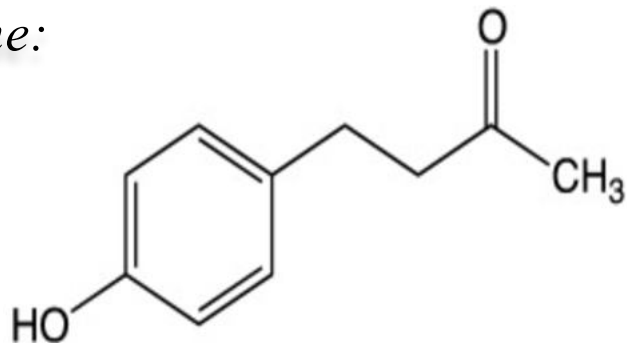
15 Marks

Q3. Derive a method to produce Raspberry Ketone, a flavoring agent from carbon or coke. (Note: You have to produce all the carbon chains required from carbon (coke) itself.

For example, ketone part of the product should also be produced from carbon.)

15 Marks

Raspberry Ketone:



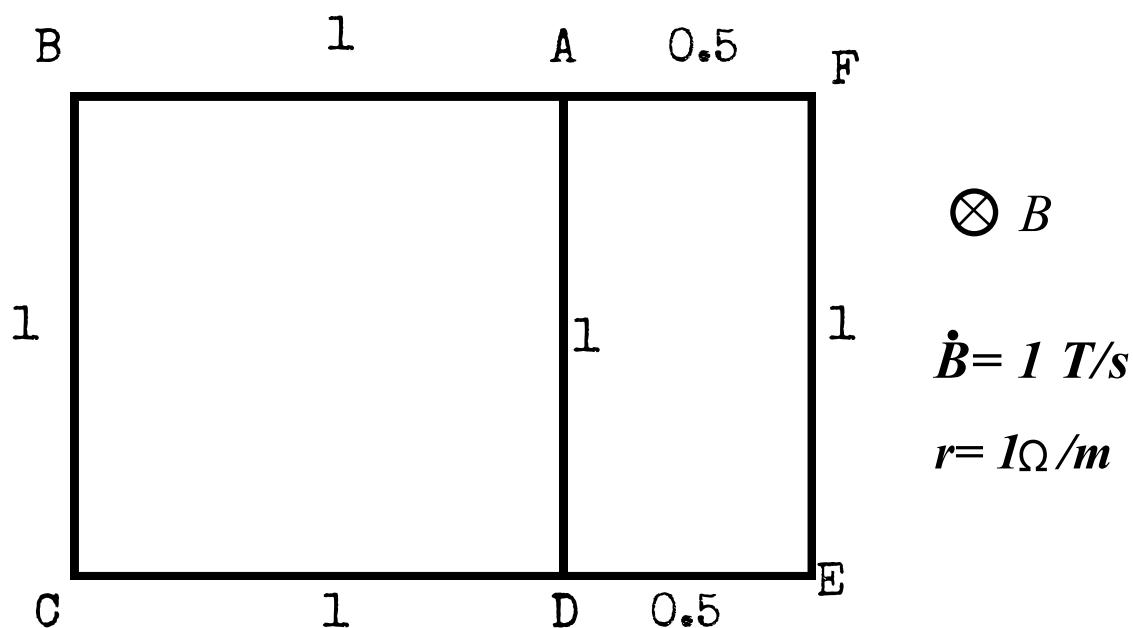
Q4. Find sum of the series:

10 Marks

$$S = \frac{\cos 2x}{1 \cdot 3} + \frac{\cos 4x}{3 \cdot 5} + \frac{\cos 6x}{5 \cdot 7} + \dots \infty$$

Q5. The numbers indicate dimensions of members in meters and 'r' is their resistance per unit length. Find out the voltage drop across each member and the current passing through each member.

10 Marks



————— *End of the paper* —————