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**m<uq jdr mÍCIKh - 2022**

**First Term Examination - 2022**

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**COMBINE MATHS – I**

**Answer all the questions of Part A and any five questions of Part B.**

**Part - A**

01. When the expression is divided by the remainder is -5. Find the values of *a* and b.

02. Find the set of solutions of the inequality, .

03. Let Express in the form Hence find the minimum values of and the value of *x* for which is maximum.

04. Show that,

05. If then show that

06. The parametric equations of the curve are and . Find the equations of the tangent and the normal to the curve at the point

07. Find the equations of the angle bisector of the intersecting line and

08. Find the area of the region enclosed by the curve , line and .

09. If and , Where and then find the value of

10. Give that and and and are acute angles. Find the value of .

**Part - B**

11. a). Let Where It is given that is a factor of , find the value of For this value of express in the form,

and determined the values of and

For these values of a, b express , where and to be determined.

Hence find the remainder, when is divided by .

b). If the roots of the equation are real, for all . Show that the roots of the equation, are also real.

12. a). Let and be the roots of the equation . Find the quadratic equation whose roots are and in terms of .

b). Sketch the graphs of and in the same diagram.

Hence find set of values of *x*, Satisfying the inequality

13. a). Let for

Show that , the derivative of is given by,

Hence, find the interval on which is increasing and the interval on which is decreasing. Also, find the coordinates of the turning points of

It is given that , for find the coordinates of the point of inflection of the graph . Sketch the graph of indicating the asymptotes, the turning point and the point of inflection.

*x*

*y*

*x*

b). A hollow composite tank is to be formed by rigidly

joining a hollow hemisphere of radius *x* and *a* hollow

cylinder of radius *x* and height *y*. The total volume

of the composite tank is .

Given that the total surface area of the tank is,

, Show that

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Find the values of and , When *A* is minimum.

14. a). It is given that there exists constant A, B and C such that,

for all . Find the values of A, B and C

Hence write down in partial fractions and find

b). Using a suitable substitution integrate,

c). Using integration by parts, show that

15. a). Let and

Find the equation of the straight line passing through the points and .

Find the equation of the straight lines and passing through each making an acute angle with .

b). Find the equations of the lines which passing through the point of intersection of the lines and and are 5 units from the point (-2,4).

16. a). In the usual notation state sine rule for a triangle ABC

In the triangle ABC Using the sine rule show that

are consecutive terms of an arithmetic series.

Using the cosine rule find the values of and .

b). Prove that,

c). Solve the equation,