MASTER’S P.U COLLEGE, HASSAN, 573201.

KCET ONLINE TEST-26, MAY-2020  **MATHEMATICS**  **TIME: 45Mins MARKS: 30**

**TOPIC**: **APPLICATION OF DERIVATIVES & DIFFERENTIAL EQUESTION. DATE: 21/05/2020**

**KEY**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **C** | **B** | **B** | **A** | **A** | **A** | **D** | **D** | **C** | **B** | **B** | **C** | **A** | **B** | **D** |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| **B** | **A** | **A** | **A** | **A** | **A** | **A** | **D** | **C** | **C** | **A** | **D** | **C** | **A** | **A** |

**HINTS AND SOLUTIONS**

1. (c) Here  and 

⇒  ⇒ 

.

*C*

*Q*

*x*

*B*

*y*

4.5

1.8

*P*

*A*

1. (b) According to the figure

**** ⇒ ****

 Required rate of length of shadow .

1. (b) If *r* be the radius and *h* the height, then from the figure,  ⇒ 

Now,  = 

*A*

*B*

*R*

*O*

*D*

*θ*

*C*

*L*

*r*

*M*

∴ 

For max. or min., 

⇒  ⇒ 

⇒  ⇒  ⇒ .

Hence *V* is max., when .

1. (a)  

Speed of the particle after 1 second



1. (a) Given curve  …..(i)

Differentiate with respect to *x*, 

⇒ 



For given line, slope of tangent 

 ⇒ 

From equation (i),  ⇒.

1. (a)  ⇒  …..(i)

Now tangent makes equal angle with axis

∴  or 

∴ 

∴ From equation (i),  (taking +*ve* sign)

⇒  ⇒ 

∴

From the given curve, when ,  and when , = 

Therefore, required points are  and .

1. (d) Slope of the normal = 

⇒ 

∴ , ∴ 

1. (d) ⇒ 

⇒ ⇒ 

⇒ 

Since tangent is parallel to *y*-axis

  ⇒ or .

Then . At  the equation of curve doesn’t satisfy.

1. (c) 





For maximum and minimum ,



 or , at  maximum and at  minimum

 ,

  or 

But , therefore 

1. (b) Let 





for all 

Hence is decreasing in .

1. (b) 









Hence functionis increasing when 



Hence or .

1. (c) 







and have same sign.

1. (a) The function defined in option (a) is not differentiable at .
2. (b) 





From Lagrange's mean value theorem,

 

At  ⇒ ⇒  ⇒ .

1. (d) For Rolle’s theorem to be applicable to *f*, for , we should have (i) ,

(ii) *f* is continuous for  and *f* is differentiable for 

From (i), , which is true.

From (ii), 

Which is true only for positive values of , thus (d) is correct.

1. (b)  ⇒  ⇒ 

On integrating both sides, we get ⇒⇒ or .

1. (a) Given ⇒

Integrating both sides, 

 ⇒ 

  or .

1. (a) Here  .....(i)

It is homogeneous equation

So now put and, then the equation (i) reduces to

On integrating, we get ⇒ ⇒.

1. (a) . Put  ⇒  ∴ The given differential equation becomes

 ⇒ 

⇒ ⇒  ⇒ .

1. (a) 



Put  ⇒  ⇒ 

 ⇒  ⇒  ⇒ 

⇒ .

1. (a) ⇒ ⇒

It is linear equation, therefore I.F. 

Hence the solution of the equation is

 ⇒ .

1. (a) ; I.F. 

Required solution is or.

1. (d) 

, .

1. (c) Given equation can be written as 

If then 

Differentiating *w.r.t*. *x*, we get

⇒⇒

Integrating *w.r.t*. *x*, we get 

; 

If , then .

1. (c) We have 

Putting so that , we get

 or 

On integrating, we get 

⇒ 

This passes through , therefore

⇒⇒.

1. (a) Length of the normal 

It is given that (Radius vector )⇒  ⇒ 

⇒  ⇒ .

1. (d)  ⇒ 

Integrating both sides,

 ⇒ 

At  then  At  then  ⇒ 

⇒ Therefore, solution is 

But  is not continuous function in  Hence,  is not possible in .

1. (c) Let  be the initial population and let the population after *t* years be *P*. Then 

On integrating, we have  At  

 ;  ⇒  When  hrs, 

  ⇒ ;   When  hours, we have

;  .

1. (a) . On integrating both sides, we get



Again .

1. (a) 









Integrating both sides, 



; .