MASTER’S P.U COLLEGE, HASSAN, 573201.

KCET ONLINE TEST-21, MAY-2020  **MATHEMATICS** **TIME: 45Mins MARKS: 30**

**TOPIC**: **VECRTORS & 3D-GEOMETRY.**

**KEY**

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

**HINTS AND SOLUTIONS**

1. (b) Volume of tetrahedron  is, , where    and 

  *cubic unit*.

1. (c) Let   and 

Let  

 ......(i)

 …..(ii)



, {from (ii)}

, (say)

  

 , {from (i)}

 .

1. (c)  

 Minimum at .

1. (c) Given **x** is parallel to **y** and **z**

   

⇒ .

1. (a) The required vector **c** is given by 

Now, 

and 





or .

Therefore, 

1. (a) Let 

Now, 

⇒ 

⇒ 

Now, 

⇒ ⇒ .

Thus .

1. (b) Given, 



Also, .

1. (b)Required vector is 
2. (d) We have  and 

Let  be the angle between  and 

Then 

,  

1. (c) 



But it is perpendicular to 

So, 

1. (d) Let  and  Since  and  are perpendicular, we have 

, 

Now, projection of  on 



Again, projection of  on 

This gives 

or 

### B

*C*

### D

**

**

*A*

1. (c)

of 



∴ Length of median  *unit*.

1. (b) Here, 



On comparing, we get 

⇒  …..(i)

and  …..(ii)

On solving equations, we get 

1. (c) 

= = 

= = .

1. (d) 

⇒ 

⇒

⇒ 

⇒  ⇒ 

Since **a, b, c** are non-coplanar, so 

 . Hence no real value of .

1. (c) Given vectors are coplanar

 

⇒ 

⇒  ⇒ .

1. (c) Since the line lies on the given plane, therefore any point on the line will satisfy the plane *i.e.*, the points (3, 4, 5) and (5, 7, 9) will lie on the plane. Hence 
2. (a) Point (4, 2, *k*) should lie in the given plane

⇒ 

1. (d) 

and .

Hence the required co-ordinates are  or .

1. (c) Let the line segment be *AB*, then as given

, , 



,

where  and  are the angles made by the line with the axes.

1. (a) Centroid = (1, 2, – 1)

; .

1. (d) We have, 

and 

Since, lines are coplanar then

⇒ 

On solving, .

1. (b) Any point on  is,



Any point on  is,



The given lines intersect if and only if the system of equations (in  and )

 .....(i)

 .....(ii)

 .....(iii)

has a unique solution.

Solving (i) and (iii), we get 

From (ii), we get .

1. (b) When folded co-ordinates will be 



*a*

*a*

*A*

*C*

*x*

*B*

*y*

*D*

*a*

*a*

Equation 

Equation 

 Shortest distance , (By formula).

1. (a) Equation of planes passing through intersecting the planes  and  is,  ……(i)

Given, distance of plane (i) from origin is 1.

 

or or 

Put the value of  in (i),



or  or 

and 

Thus the required planes are  and .

1. (a) , we get *l, m, n* from these equations and then putting the values in   we get the required result.

**Trick:** Checking conversely,



So, it passes through given point.



So, it is perpendicular to .



So, it is perpendicular to 

1. (c) Obviously, .
2. (a) Line joining the points (3,5,–7) and (–2,1,8) is, 

, (Let) …..(i)

∴ , , 

 Line (i) meets the *yz*-plane

 

Put the value of *K* in 

So the required point is (0, 13/5, 2).

1. (b) Given line is, , (say)

∴ Point on the line is

 .....(i)

This point must satisfies the equation of plane

∴ 

From (i),.

1. (c) A general point  on the line should satisfy the required plane, which is satisfied by 