

UNIVERSITY OF SARDODHA

DEPARTMENT OF PHYSICS

Conduct of Online Mid Term Exam Assignment through zoom. The due date of submission of Mid Term Exam Assignment is 24-04-2020

Subject: Vector & Tensor (MATH-210)

Teacher Name: Nida Ibrar

Email ID: nida.ibrar1994@gmail.com

ASSIGNMENT

Student Name:

Student ID:

Q1. Define Vector algebra and their properties with example and graphically. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 8:00 am**

(M USMAN (01))

Q2. Proof theorem if $\vec{a}, \vec{b}, \vec{c}$ are three given non coplanar vectors, then any vector \vec{r} can be expressed uniquely as linear combination of $\vec{a}, \vec{b}, \vec{c}$ such as $\vec{r} = x\vec{a} + y\vec{b} + z\vec{c}$ where Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Aqsa Bashir (02))

Q3. Explain direction cosines in details and suppose 3 vector also find their sum and direction cosine. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 8:30 am**

(M. Danial (03))

Q4. Find the value of β , If the vector $5\hat{i} + 4\hat{j} - 3\hat{k}$ and $2\hat{i} + 2\hat{j} - \beta\hat{k}$ have the same direction. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Rubab Akram (04))

Q5. Three edges of a unit cube through the origin O represent the vector i, j, k respectively. Write the diagonal expression for the vectors represented by

- (1) *The diagonal of the cube, through O.*
- (2) The diagonals of the three faces passes through O.

Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Rabia Akthar (05))

Q6. Three vectors of magnitude $a, 2a, 3a$, meet in point and their direction are along the diagonals of adjacent faces of a cube. Determine their resultant and direction cosines. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 9:00 am**

(M. Asif (07))

Q7. Find a unit vector which make an angle of 45° with $\vec{a} [2, 2, -1]$ and an angle of 60° with $\vec{b} [0, 1, -1]$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 9:30 am**

(Rafaqat (08))

Q8. The vector $\vec{a} = 2i - j + k$; $\vec{b} = -i + 3j + 5k$ represent the two side of ΔABC . Find its 3rd sides and also the angle of this triangle. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Kainat Zahra (09))

Q9. The vector $\vec{a} = 3i + 6j - 2k$; $\vec{b} = 4i - j + 3k$ represent the two side of ΔABC . Find its 3rd sides and also the angle of this triangle. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 8:00 am**

(Hamza Arif (10))

Q10. Find two unit vectors which make angle of 60° with vector $i - j$ and $i - k$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 8:30 am**

(M . Muzamil (11))

Q11. Find the acute angle angles which the line joining the point (1,-3,2) and (3,-5,1) make with coordinates axis. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 9:00 am**

(Ammar Yasir (14))

Q12. Prove that $|\vec{r}_1 \cdot \vec{r}_2| \leq |\vec{r}_1| |\vec{r}_2|$ and state the condition for $\vec{r}_1 \cdot \vec{r}_2 = |\vec{r}_1| |\vec{r}_2|$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 9:30 am**

(Tariq Saeed (16))

Q13. Prove that $|\vec{r}_1 \cdot \vec{r}_2| \leq |\vec{r}_1| |\vec{r}_2|$ and state the condition for $\vec{r}_1 \cdot \vec{r}_2 = -|\vec{r}_1| |\vec{r}_2|$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Kashfa Aslam (17))

Q14. Prove that the sum of the squares of the diagonals of any parallelogram is equal to the sum of squares of it sides. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Maryum Nazir (18))

Q15. Show that the line joining consecutive mid-point of the sides of any square form a square. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 8:00 am**

(Rizwan Javeed (20))

Q16. Prove that by using vectors $a = b \cos\gamma + c \cos\beta$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Iqra Farooq (21))

Q17. Prove that by using vectors $b = c \cos\alpha + a \cos\gamma$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 10-05-2020 at 11:00 am**

(Nargees Parveen (22))

Q18. Prove that by using vectors $c = a \cos\beta + b \cos\alpha$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 8:30 am**

(Asif Ameer (24))

Q19. Prove that by using vectors $a^2 = b^2 + c^2 - 2bc \cos\alpha$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 9:00 am**

(Umer Abdullah (25))

Q 20. Prove that

a) $\sin(\alpha - \beta) = \sin\alpha \cos\beta - \cos\alpha \sin\beta$

b) $\sin(\alpha + \beta) = \sin\alpha \cos\beta + \cos\alpha \sin\beta$

Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Zainab Ashraf (26))

Q21. If the diagonals of a given parallelogram are taken as its adjacent sides of a second Parallelogram, then prove that the area of the second parallelogram is twice the area of given parallelogram. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Iqra shahzadi (27))

Q22. Find a set of vectors reciprocal to the set of $-i + j + k$; $i - j + k$ and $i + j + k$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 9:30 am**

(Sharafat ali (28))

Q23. If $\vec{f}(t)$ & $\vec{g}(t)$ are continuous at $t = t_0$. prove that $\vec{f}(t) + \vec{g}(t)$ is also continuous at $t = t_0$

And find that $\vec{f}(0)$ is continuous where the given function is $\vec{f}(t) = t i + t^2 j + \frac{1}{t} k$.

Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 8:00 am**

(Asif Iqbal (29))

Q24. Prove the rule of differentiation in vector calculus Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 06-05-2020 at 8:30 am**

$$\frac{d}{dt} [\vec{a} \cdot (\vec{b} \times \vec{c})] = \frac{d\vec{a}}{dt} \cdot (\vec{b} \times \vec{c}) + \vec{a} \cdot \left(\frac{d\vec{b}}{dt} \times \vec{c} \right) + \vec{a} \cdot \left(\vec{b} \times \frac{d\vec{c}}{dt} \right)$$

$$\frac{d}{dt} [\vec{a} \times (\vec{b} \times \vec{c})] = \frac{d\vec{a}}{dt} \times (\vec{b} \times \vec{c}) + \vec{a} \times \left(\frac{d\vec{b}}{dt} \times \vec{c} \right) + \vec{a} \times \left(\vec{b} \times \frac{d\vec{c}}{dt} \right)$$

(Afaq ul Hassan (30))

Q25 . Define Vector algebra and their properties with example and graphically. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 8:00 am**

(Mazhar Iqbal (34))

Q26. Proof theorem if $\vec{a}, \vec{b}, \vec{c}$ are three given non coplanar vectors, then any vector \vec{r} can be expressed uniquely as linear combination of $\vec{a}, \vec{b}, \vec{c}$ such as $\vec{r} = x\vec{a} + y\vec{b} + z\vec{c}$ where Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 08-05-2020 at 9:00 am**

(Nouman Ali (36))

Q27. Explain direction cosines in details and suppose 3 vector also find their sum and direction cosine. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Laraib Fayyaz (38))

Q28. Find the value of β , If the vector $5\hat{i} + 4\hat{j} - 3\hat{k}$ and $2\hat{i} + 2\hat{j} - \beta\hat{k}$ have the same direction. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Baseerat Manzar (E-34))

Q29. Three edges of a unit cube through the origin O represent the vector \hat{i} , \hat{j} , \hat{k} respectively. Write the diagonal expression for the vectors represented by

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(Nishat ul sani (E-39))

Q30. Three vectors of magnitude a , $2a$, $3a$, meet in point and their direction are along the diagonals of adjacent faces of a cube. Determine their resultant and direction cosines. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 8:00 am**

(Hassan Abbas (E-005))

Q31. Find a unit vector which make an angle of 45° with $\vec{a} [2, 2, -1]$ and an angle of 60° with $\vec{b} [0, 1, -1]$. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Nimra Safdar (E-004))

Q32. The vector $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$; $\vec{b} = -\hat{i} + 3\hat{j} + 5\hat{k}$ represent the two side of ΔABC . Find its 3rd sides and also the angle of this triangle. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 11-05-2020 at 11:00 am**

(Saba Mushtaq (67))

Q33. The vector $\vec{a} = 3\hat{i} + 6\hat{j} - 2\hat{k}$; $\vec{b} = 4\hat{i} - \hat{j} + 3\hat{k}$ represent the two side of ΔABC . Find its 3rd sides and also the angle of this triangle. Given reason to support your answer and show your work not less than 15 pages. **(10) Your presentation/Viva will held on 07-05-2020 at 9:00 am**

(Waseem Akram(53))

