Pg #01

GNMENT

Applied Physics AgSSIGNMENT - I

VECTORS

Student Name : M. Tahir Roll Number : 21k- 4503

Section : BSCS (E)

QUESTION :01 A displacement vector in the ny plane is 7.3 m long and directed at angle of 30° in figl. Determine a) n component b) y component of vector...

Solution: Data:

8 = 7.5m 8n=?

Formula :

Хү -|ъl te s*o*

8. = 18 l sina Calculation

8x=18 cosce in = (7.3) Cos 30° n = 6.3am

= 18. Since = (7.3) Sin 30° = 5.65m

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Pg #02 QUESTION : 02 The two vectors a & b (Fig-2) have equal mag of 10m and the angles are Q = 308 Q2 = 105 . Find (a) x & y components of their rector sum 8(b) Mag of 8 and (c) Angle 8 makes with the positive direction of n-anis. Solution :

La Formula : Data:

(i) au-lalcosce â cb = 10m man - lal since Q-30 8 0 2 = 105 in x = 102 +62

(iv) a= tan tay Calculation :

Finding a 8 ÿ Component din = lãlcosce

ay = lål. Since an = 110) Cos 3

ay = 1101 sin:30° I ax = 8.6602 m l lay = 5ml

2

br = 16 l coso

= 1 101 Coslos" b2 = -7.0711ml

by = 15lsince

= 1101 Sir los by = 7.071m)

For

y Component of vector

Sum;

on = ant br

x = (8.6602)+(-7.07 11.) Ton = 1.5891 ml

8y = ay + by

ry = 15) + 1.7.071). Try = 12.07.1ml

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Pg #03

For

Magnitude of 8

8 = Jose 2 + 8y2 Y = 111.58)\* +102.07) .8=12.1752 m 1

Finding

Angle with positive n-anis ;

Q = tant Q = tan 112.07-11) To = 82.501

QUESTION:03 For vector in fig-3 with a=3, b=3& cas, what are (a) the mag and direction of axb. (b) the mag & direction of axc and (c) the mag & direction of bxc? Solution:

Formulas: Data:

1 (i) a= tanilt) a=4 bi3.& c=5 (1) faxbl = absino

Ford Angle b/w a & b:

a = 605' (ab) Q = 90°

\* B-cos" (byte) Angle b/w b & C and

Qa= tan(use) = tan'lů) = 36.86 cm Angle b/w a &c:

@, & 'da + Q 3 = 180°

*Q*3 = 18*0*°-90° -3*6.86*

Q3= 53.13°

For Bag

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Pg #04

Calculation :

Magnitude of axb;

Taxbl = absino = (4) (3) singoo Tlaxb = 12 units - Magnitude of bocs.

Ibac L = bc sino a = (3) (s) sin 36.86 1 lb xel = a units Magnitude of axe;

laxele ac sino = (4) (5) Sin 53.13 Tlaxcl = 16 units

Direction of axbor Direction of bxe

a=cosila at B= cos(boc): Pas 90°

. B= 36.8*69* 1. Direction of a xeo

8 = cos lac) 1 8 = 55.13

QUESTION :04 By Considering the above problem to find the (a) a ob (6) bxc (c) angle b/w a & b. Solution: Formula: Data: 8 =10ml (i) a.b=abcosa . Angles ã and b make with n-anis are @= 30° & Ca = 135

Calculation: Finding a.b;

a. b = ab Costa a eq (i).

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Pg #05

w a and b is = 3.

Q3 = "180° +30°- 135

Q = 7.56°/ eq (1) => a. to=abcos 75°

= /10) (20) costs . Ta o = 25.80 m) Finding a bi

axt = ab sino

= (10) (10) Sin 75 là b = 96.59 m

QUESTION : 05 The n component of vector A is asm and y component is uom (a) Mag of A? (6) Angle blw direction of & positive direction of a? Data: Ax 25 in Formula:

Ay = 40 ml (i) IA1 = a + b 2 Calculation :

(i) a = tan (AL) Finding Magnitude of A;

IA I = J Andra ya

1A) = (as)' +140)" LA = 47.169 |

For

Angle ;

0 = tan (Ay)

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kust

look

Formula :

QUESTION :06

Pg #06 A ship sets out to sail to a point 120km due hortha An unexpected storm blong the ship to a point lookm.. (a) How for? (b) in what direction it sail torluch ts.

original destinations solution :

Data:

Vào 1 ). n = 120 km ci) 10/= Joit bo

Ay = 100 kim (ii) a= tan ( A ). Calculation :

For Distance ;

D = 5 An+Ay2 = (126) + (100)

D = 156.2 kml Fox Angle;

@ = tant

Q = tan

100

120

10 = 50.194

QUESTION : 07 Three vector a, b&c. have a mag of som andlie in an my plane. Their direction is relative to a point 100 km due East of starting point (a) How for (b) 30 1950 & 315 what are the mag & angle of atbtc & t abt

Find fourth rector a such that catb) -(c+d) =o?

Formula : Solution !

(6) Anacosce Data:

(o)=tan(A) a = b = c = 50ml

. Q . = 30° la = las and C 3 = 315° Calcwation:

An= a Cosoi Br=bcosca (n=cCosco Ax = 25.93m Br= -26.97m (n=21.21 m) Ayasino, By= b sinda Cy= csinQz Ay = 15 m [By = -7.76m Cy=-21.21m

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Pg# 07

Leta

. a + b + c = F So,

Fu= an + bn tcn I Fx = 18.21 ml

Fy = ay+by + cy [Fy = -13.97m.

TE=22.96 in an=43.30m bn = - 48.2am ay= 25m by=-12.94

Cn = 35.35m Cy=-35.35m

30. 3*6/*

Fn = 30.36m Fy=-23.2am

F = 38.26ml For angles 21:*0 0*

Oi= tan. (Artan 123

I Qq = 37,490 For a-btc i Let,

a-b + c =G. (n=an+boten =(43.30)+(-48.29)+(35.35)

Gn=126.95 m

Gy=ay +by+cy = (25) + (-12.94) +(-35.35) [(y= 2.58 m)

G = 126.97m !

OF 16 1667

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Pg#08

d

such that

For Magnitude &

(a+b )-

Angle of fourth vector (c+d) = 0

Lantbal-lcntdy) 113.30-48.29)-(35.35 +da)=0 (-4.995)-(35.35) + dx -40.35-dn [- dx = 40.351

Idn = - 40.35lm

(ay+by) - ( Cy+dy) = 0 (25-12-94) - (-35.35 + dy) = 47.4143- dy =o.

I dy=- 47. 4143m

d = 62.2596)

TQ = 49.60°

QUESTION : 08 Solution:

Formula:

(i) Costo = At Data:

À = 2; 3; +5K Calculation:

Cosa - A = 2164 6 On=cos (164)

On = 35.79

Allkl

Cos

dy

= TALLY

=

6.164

cos Oy - A. l = 164

dy = Cost (164) Qy = 116.97

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Pg #04

Cos Oz

- 11 12

= 66164

(is) arb = a b

To z=35.790

QUESTION :09 Solution:

Formula: Data:

lihlal = a + b 2 + a = Si + 4 - 6K b =-2i+2; +3K 1 ) cose-a. bo

ab. = 4; +3j tak

8 = at btc Calculation:

Finding Angle blw a & b. lal = √(s) + (42+(-672

la = 125 + 16 +36. Tlal = 8.7751

Tbl = 51-2)2 + (2)2 + (3)

b) = Tu + 4 + c 116) = 4.1231

aob

=

a b

(1)

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Pg # 10

a. b + (Si + 4- 6K) .(-214 2; +36)

aob = -106+8 - 18. Laub= -201

eqli) =>

Cosc

ab cosce whea*t*

(8.77 55(4.133) a = cost (-0.55) 1 = 123.5593)

:8= a + b + c

x=(5-2 +4+1 4+2+3)jet (26+3+2)k ...8= 7it aj-k

101- J (7) 2+ (9) ?- (1) 2

10l = 49+81 + 1 Ilol - 11.44551

Angle with 2- anis Cosa = 8. Z = -1

XZ 11.4455 @= 957

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Pg # 1

*Q*UESTION : 10

Solution : Data:

Formula: (i) coso = A B

AB

Á = B = . B =

6 units 7 units

14

Calcuation:

Cosa - Ã .

АВ Cosa = 14

(

617) Cosa = 0.333

- - Cos'10.333). To = 70:52]

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