## 47\_ YASH SARANG



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in figure. Find the force P and Q such that the resultant of five force is zero.

FBD3

30N 40N

40 cers 60'

Q 02 ces 30'

Since resultant is zero, forces about it zero, and Y axis will be zero.

 $F_{2} = 0 \quad ( \rightarrow + \pi )$   $\therefore 40 \cos 60^{\circ} + Q \cos 20^{\circ} - 30 = 0.$   $\therefore Q = 21.2836 \text{ N}$ 

∴ ∑Fy = 0 (↑ +ve)

50 + 40 sin 60° - Qsin 20° - P = 0.

[: P = 77.3616N]

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For the system shown, determine

1) The required value of X of resultant of three forces is 1) The corresponding magnitude of resultant 200 cm x - x ( ) ( x - > 100 cm x + 150 cm (301x) 900 sin X+ 150 si (30+100N 1) For resultant, horizontal componet is zero 10000 x + 150 cos (x+30) - 200 cosx = 0. 3 cos (X+30) = 2 cos x. 3 caxxx 53 - 3 sinx = 2 coex (35) -24) = 3 sind : ton x = 5-4  $C = \tan^{-1} \left( \sqrt{3} - \frac{4}{3} \right) = (21.74)^{\circ}$ Fy = - (300 sin (21.74)" + 150 sin (51.74)") = -228,8999N .. R = 228,8999N(V)

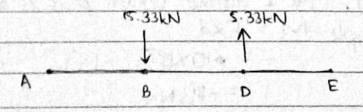
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<u>s)</u>	FBD: Tigure shows a parallel system of four forces and two complex
	8KN
- 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	3m 1.5m 1.5m 2m lm
-	i) Replace it by a single force and obtain its location from point A.
	This is a system of 4 parallel forces and two couples.  So Resultant force $R = \sum F_y = (\Lambda + ve)$ $= (-8 - 4 - 10 + 12)$
	= -10kN = 10kN &  Let us assume that the resultant force is located at a distance of form A.
	Using Varignon's theorem, $\Sigma M^{r} = \Sigma M^{R}  (U + ve)$
•	: - 10 xd = -4x3 - 10x6 + 12x9.  [: d = 1.4m. / (from right of A) A BLOEF
	ii) To replace it by a force couple system at point A, we
	need to shift resultant force R=10kN to point A by introducing a couple M. The I distance between point A and force R is 1.4m.  Guple M = Fxd
	= -10×(1) = -4 kNm R
	S.M = 14 KNm CP



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we me need to shift force R = 10kN to point D by	A
introducing a couple Mo. The I distance between D and force R is 4.6m.	
Couple Mo = Fxd	
$= + (10 \times 4.6)$	
Couple M <sub>D</sub> = Fxd = + (10x4.6)  M <sub>O</sub> = 46kNm O A B 46Nm F	
The force couple system at D is shown.	6
The force couple system at D is shown.  The couple of 46kNm at D can be replaced by two parallel forces at B and D, equal in magnitude and opposite in sense.	_
Couple Mo = Fxd	
46 = FX3 (dist 6tw B and D is 3m) ∴ F = 15.33N.	
Force FB = 15.33N l at B and	

Fo = 15.33N 1 at D con replace the couple of 46kNm

Adding forces at Die -10 + 15.33 = 5.33 RKN, we get the two parallel components as 15.33 KN (4) at B and 5.33 KN (1) at D as shown.



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4)	Determine the result of the	susten of losces shown in figure.				
	locate the soft stone the	regulfant cuts the base AB.				
	Determine the result of the system of forces shown in figure. Locate the point where the resultant cuts the base AB.					
	7BD:					
	80 ce 860°	/30°				
	60'5	100 vs 30				
		The state of the s				
	80% 80 sin 60°	120° > 120° 20°				
•	120N 120sin7s° 2m 150 150N					
						120 ces 75° 2m 1 2m
	120 CB 13					
	This is a system of five general forces					
		Using method of resolution,	A Secretary Application of the second			
100 CH 10	SF = 100 cos 30° +	150 cm 50° - 120 cm 75° - 80 cm 60°.				
	(-> tre) -					
	ΣF <sub>2</sub> = 111.96N (→)					
		and the state of t				
	$\Sigma F_{y} = 100 \sin 30^{\circ} + 120 \sin 75^{\circ} - 80 \sin 60^{\circ} - 150 \sin 50^{\circ} - 50$ .					
	(1 tre)	L. Charles and Charles and Charles and Administration of the Control of the Contr				
	= EFy = 68.28N (					
	Now, [=3,=2]	10- 5E 68.28				
	Now, $R = \sqrt{F_x^2 + F_y^2} = \sqrt{11}$	$1.96^2 + 68.28^2$ for $0 = \sum F_4 = 68.28$ $\sum F_2 = 111.96$				
	≈ R = 131.14N	O= 31.38°.				
	Resultant is located in IVth quadrant.  R= 131.14N (\frac{31.38}{})					
	Resultant is located in 1	googrand				
	K= 131.14N ( 31.38)					
	The Str. 1985, 1985 Str. 1970, 1970 Oct. 2017 Str. 1985					



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	for beation of resultant, Let us assume the resultant is at a perpendicular distance d' from point A, to the right of A.
	Using Vongnois theorem,  A 2 31.38.
	All pears American Street Control of the Control of
Annual Contract of the local	$-131.14 \times d = 80\cos 60 \times 4 + 100\sin 30 \times 4$ $-\left[50 \times 2. + 150\sin 50 \times 4 + 150\cos 50^{\circ} \times 2 + 100\cos 30^{\circ}\right]$
-	Cood = 5.623m. (I distance from right of A).
ACCESS OF THE PERSON	Let the resultant force $R$ cut the base $AB$ at a distance x form $A$ .  From geometry, $\sin O = d/x$ .
Control of Control	$3 \frac{1}{10.8} \frac{31.38}{10.8} = \frac{5.623}{2}$
The second second	
	en en la companya de
The second second	