Allocation Process R, R2 R3 RIR2 R3 0 7 5 3 Available 200322 R<sub>1</sub> P<sub>2</sub> 3 0 2 902 2 2 2 4 3 3 Suppose at time T, places P, request 1 additional instance of resource type R3. Can the request be granted immediately => Request of P2 (1,0,2) needs = 902-302 = 600 Regulat & need 102 £ 600 Available = Available - Request Need = Need of 32 hard 000 £0 0000 c . The places of nequest can not be granted immediately Comidle a set eyotem with set of 5 places & 4 Resources MAX ABBCD Allocation Od Onlo 2 Jan per 1 susais 1 7 5 0 2 3 5 6 Avoidable 2 3 5 6 A B CD 0 6 3 2 (i) of the request from places P, arrives for accounce type e instances for resource type 'C'. An the dequest be granted immediately

Albertian Request of P, (0, 4, 20) E 1 2 2 need = 1750 - 1000 = 0750 Request & need 0420 60750 0500 1 1 0 2 2 2 457~ 2 5 5 V was at tone Ti faces of majorist mantain 0 £ 0 × 100 insume tope Reg 2 instance of humanica Request & Available gented insudiately Dequett of Po (1,0,2) 0420 £ 1520 nudo, = 902 - 302 = 600 0 6 1 N 4550 point = wind 262~ 0 5 0 N Need = Need # Request Available z Available-lignest = 0750 F 0420 = 1520 - 0420 201110 I be granted timinedately Min 2012 033000 101 Allocation = Albeation + Request = 1000 + 0420 = 1000 + 0420 this material that a substantial terms Process P, request can be granted immediately

i) Suppose on granting the above P, request can the

system be in safe state or not

Available = 1100

Ollocation of P, = [420 Ned of P1 = 0 750 0330 a instances for because type "C". an the

week = available = 400. PLOCELLS Allocation Need Po AB CD naed Ewalk AB CD 0012 0000 4 20 750 0330 0330 = 1100 54 2 3 5 6 1002 6 32 0 652 0 0 2 0 14 0 5 0 1 01 01 0 0 56 0642 Po work = available = 1100 1001 need & work Roll back 138 0000 5 1100 R.C. 10018 = 2101012 061 med & work 051 0 50 0330 5 2 10 10 12 040 work + allocation = 1100 + 0012 WOLK = 1112 i= 1, P, need & work 0330 & 1112 controller tollocation 0 501 361X 361 X 8 10 12 1Q 062 1=2, P2 work = 1112 ned & work 10025 1112 = work + allocation work 0 2016 11 51 109 9 2 2 0 6 10 10 marké FILF 051 123, P2 Le At Time Work = 2466 antomia need & work work = work + allocation 00202 2466 = 2466+ 0632 052 054 2 2 10 9 8 26 6 2 5 6

P4, work = 2 10 9 need & wolk 0642 = 21098 work = work + allocation = 21098 +001q 0 6 2 6 510 = 2 10 10 12 469 1 1001 = available = 1100 258 Roll back PP, wolk = 2101012 heed & work 0330 5 2 10 10 12 12 Byk + allocation: 1100 + 0012 = 9,30 3 5 10 3 510 0 5 12 0330 6 1112 work = work +allocation = 21010 12 + 1420 z 3 14 12 18 .: System is in rafe state & safe sequence is Po, P2, P3, P4, P1 4) Consider a system with a set of 5 places Po, P1, P2, P3, P4. There are 3 types of recourses R, R2, R3 Thue one 10 instance q R, , Sinstance R& G 7 instance R3. The At time to situation is as follows Allocation MAX R<sub>1</sub> R<sub>2</sub> R<sub>3</sub> PR2R2 Po 1 0 7 5 3 11 8 0 2 0 3 2 2 902 211 2 2 2 D 02 26

Banker's algorithm for the following question by the system in rafe state at to (ii) Suppose at time of process P2 request 1 addition inchange
of suppose type R1 & 2 instances of resource type R3 will the plocest be granted immediately (ii) After grenting process P2 Request, will the signless to safe state Need Pr R3 Available R<sub>1</sub> R<sub>2</sub> R<sub>3</sub> 10-7 5-2 7-5 8 3 2 Pu 4 3 1=0, Po, work = available = 332 ned & work 743 £ 332 7 5 3 X 11001 4 £ 3 × 010 3 £ 2 x Pi, need & work = work + allocation 122 & 332 = 332 + 200 1530 Pr WOLK = 532 niede work. 600 c 532 655× 053 052

P3 wak = 682need 2 work  $011 \le 532$  045  $1 \le 3$   $1 \le 3$   $1 \le 2$   $1 \le 2$ need & wok work = work +allocation 43 1 & 743 457 - 743 + 002 = 795 153 Roll back P. week = available = 332 Po work = 745 ned 5 work ned & work 743 4 329 743 5 745 DOLK = W. Ock + allocation 767 464 2 7454 010 355 = 753 P2 1 work = 753 hed & work 600 £ 785 work = wale +allocation = 755 + 302= 1057.! System is in safe state E safe signerel P1, P3, P4, Po, P2

P. regnut = (110,2) nead = 600 request & need 1026 600 160 .250X ;. The placed Pr request can not be granted immediately (iii) Since the process request come not granted and hence forth no need to apply safety algorithm as values remains same 5) Consider a system with set of 3 Process Proces Allocation
A B C MAX A B C Available 2 2 3 3 6 8 A B C 2 0 3 4 3 3 2 3 0 1 2 4 3 4 4 (1) Calculate need (a) Chick whither system is in safe state or not (b) of the P3 closes not want any addition instance of type A, B, C. Is there any necessarity to apply usuale request algorithm request algorithm (c) Suppose if P, request for a addition instance 9 type A, 6 addition instance 9 type B, 8 addition instance mudiately of but immediately or not

(of) Suppose on granting process request, check

if the system is in safe state or not

peadlock detection problems. y Consider a set of system with set of & process Allocation Request-Process A B C 0 0 0 Naliable 0 0 0 A B C 0 0 0 0 0 0 1 0 2 0 0 **3 0 0 3** 2 1 1 as 300 40 12th 1 = y work = available = 000 sh Procees a Voration Po, new request & work 000 5 000 V work = work + allocation Majores 000 + 010 P, wark = 010 request & work of a 202 £ 010 X 000 = 1000 = 1 R work = 010 puquest & work Hequest & work 000 £ 010 V ESSE E ESSEL + allocation work = work + allocation = 010 + 303 9, well : 010 = 3103 haquest & work 202 & 010x P3 work = 313 is request tweel request \$ 100 work 100 5313 ~ 010 8 100 work: work falloction NACO Z MARIA = 313 + 211 = 523 P4 = work + allocation WOIK = 523 = 523+002 request & work = 525 00 2 5 523 XV

holl back Rep. work=528 lequest & work 000 202 £525 KV Pyx wolk =521 regnest Ework 002 2521 i System is not in Leguet Janger 24 Process Allocation A B C 0 Po 2 DVailable 8 0 3 A B C 0 0 0 2 11 13 00 0 0 2 Mac & January 0 0 2 Ru Pr = work = 000 pregnest & work march & park 000 € 000 wak z work + allocation = 000 + 010 = 010 P1, work = 010 request & work 2025010x Pr, request &wash Pz, lequest & work

100 E 010x

DAY in si matter : Roll back .: Sendbook is detected by mount = want P2, Majuet - work x0103160 x 0,00 7 7 000 in the system