

## IP Address



## IPv4 Address



## 32 bit address



$$2^{32} = 4.3 \text{ Billion}$$

↑ Represented in Dotted Decimal Notation

0 0000000 . 0 0000000 . 0 0000000 . 0 0000000

255 255 255 255

$$= 0.0.0.0 - 255.255.255.255$$

IPv4 Address is divided into 5 class

class A 0 0000000 . 0 . 0 . 0      | 127 . 255 . 255 . 255  
           | 0 . 0 . 0 . 0      | unicast

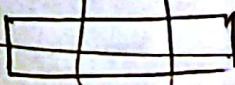
class B 1 0 000000 . 0 . 0 . 0      | 128 . 0 . 0 . 0 - 191 . 255 . 255 . 255

class C 1 1 0 00000 . 0 . 0 . 0      | 192 . 0 . 0 . 0 - 223 . 255 . 255 . 255

class -D 1 1 1 0 0000 . 0 . 0 . 0 → multicast  
           | 224 . 0 . 0 . 0 - 239 . 255 . 255 . 255

class E 1 1 1 1 0 000 . 0 . 0 . 0 → Experimental  
           | 240 . 0 . 0 . 0 - 255 . 255 . 255 . 255

class F



class A

N/w  
bit →  
Host  
bit →  
8 bit      20 bit

class B

N/w      Host  
16 bit      16 bit

class C

N/w      Host  
24 bit      8 bit →

subnet

/8

/16

/24

Total subnets

$$2^8 = 256$$

$$2^{16} = 65536$$

$$2^{24} = 16 \text{ million}$$

$$2^{16} = 65536$$

Total Host/subnet

$$2^{24} = 16 \text{ million}$$

$$2^{16} = 65536$$

$$2^8 = 256$$

subnet

/8

subnet Mask

$$\underbrace{1\cdot1111111}_{255} \cdot 0 \cdot 0 \cdot 0$$

/16

$$1111111111111111 \cdot 0 \cdot 0$$

$$255 \cdot 255 \cdot 0 \cdot 0$$

/24

$$111111111111111111111111 \cdot 0$$

$$255 \cdot 255 \cdot 255 \cdot 0$$

→ Nearest

Unicast (1 - 1)

Multicast (1 - Many)

Broadcast (1 - All)

Anycast (1 - nearest)

Subnetsubnet mask  
base

/28

11111111111111111111111111111111

/32

/28

$$\text{Host bit} = 32 - 28$$

$$= 4$$

$$\text{Total Host} = 2^4 = 16$$

255. 255. 255. 11110000

• 240

255 → 11111111
- 15 ← 1111
240

/32

255. 255. 255. 255

/30

$$\text{Host bit} = 2$$

$$\text{Total Host} = 2^2 = 4$$

255. 255. 255.

111111. 111111. 111111. 1111101.

255. 255. 255. 252. 252

255

3

252

254  
842  
188

/25

111111. 111111. 111111. 00000000

255. 255. 255. 188

/27

255. 255. 255. 223. 255

/22

255. 255. 252. 0

192.168.1.0/24

$$\text{Host bit} = 32 - 24 = 8$$

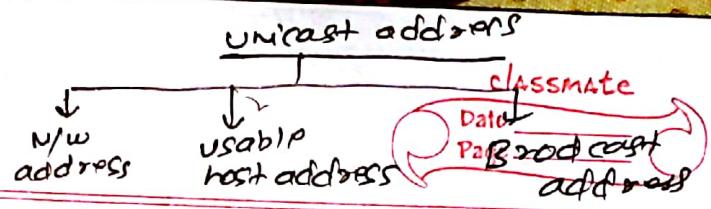
$$\text{Total host} = 2^8 = 256$$

Host bit

192.168.1. 00000000/24

/24

192.168.1. 1' 2' 3' 4' 5' 6' 7' 8' 9' 10' 11' 12' 13' 14' 15' 16' 17' 18' 19' 20' 21' 22' 23' 24' 25' 26' 27' 28' 29' 30' 31' 32' 33' 34' 35' 36' 37' 38' 39' 40' 41' 42' 43' 44' 45' 46' 47' 48' 49' 50' 51' 52' 53' 54' 55' 56' 57' 58' 59' 60' 61' 62' 63' 64' 65' 66' 67' 68' 69' 70' 71' 72' 73' 74' 75' 76' 77' 78' 79' 80' 81' 82' 83' 84' 85' 86' 87' 88' 89' 90' 91' 92' 93' 94' 95' 96' 97' 98' 99' 100' 101' 102' 103' 104' 105' 106' 107' 108' 109' 110' 111' 112' 113' 114' 115' 116' 117' 118' 119' 120' 121' 122' 123' 124' 125' 126' 127' 128' 129' 130' 131' 132' 133' 134' 135' 136' 137' 138' 139' 140' 141' 142' 143' 144' 145' 146' 147' 148' 149' 150' 151' 152' 153' 154' 155' 156' 157' 158' 159' 160' 161' 162' 163' 164' 165' 166' 167' 168' 169' 170' 171' 172' 173' 174' 175' 176' 177' 178' 179' 180' 181' 182' 183' 184' 185' 186' 187' 188' 189' 190' 191' 192' 193' 194' 195' 196' 197' 198' 199' 200' 201' 202' 203' 204' 205' 206' 207' 208' 209' 210' 211' 212' 213' 214' 215' 216' 217' 218' 219' 220' 221' 222' 223' 224' 225' 226' 227' 228' 229' 230' 231' 232' 233' 234' 235' 236' 237' 238' 239' 240' 241' 242' 243' 244' 245' 246' 247' 248' 249' 250' 251' 252' 253' 254' 255' 256' 257' 258' 259' 259' 260' 261' 262' 263' 264' 265' 266' 267' 268' 269' 270' 271' 272' 273' 274' 275' 276' 277' 278' 279' 280' 281' 282' 283' 284' 285' 286' 287' 288' 289' 290' 291' 292' 293' 294' 295' 296' 297' 298' 299' 299' 300' 301' 302' 303' 304' 305' 306' 307' 308' 309' 309' 310' 311' 312' 313' 314' 315' 316' 317' 318' 319' 319' 320' 321' 322' 323' 324' 325' 326' 327' 328' 329' 329' 330' 331' 332' 333' 334' 335' 336' 337' 338' 339' 339' 340' 341' 342' 343' 344' 345' 346' 347' 348' 349' 349' 350' 351' 352' 353' 354' 355' 356' 357' 358' 359' 359' 360' 361' 362' 363' 364' 365' 366' 367' 368' 369' 369' 370' 371' 372' 373' 374' 375' 376' 377' 378' 379' 379' 380' 381' 382' 383' 384' 385' 386' 387' 388' 389' 389' 390' 391' 392' 393' 394' 395' 396' 397' 398' 399' 399' 400' 401' 402' 403' 404' 405' 406' 407' 408' 409' 409' 410' 411' 412' 413' 414' 415' 416' 417' 418' 419' 419' 420' 421' 422' 423' 424' 425' 426' 427' 428' 429' 429' 430' 431' 432' 433' 434' 435' 436' 437' 438' 439' 439' 440' 441' 442' 443' 444' 445' 446' 447' 448' 449' 449' 450' 451' 452' 453' 454' 455' 456' 457' 458' 459' 459' 460' 461' 462' 463' 464' 465' 466' 467' 468' 469' 469' 470' 471' 472' 473' 474' 475' 476' 477' 478' 478' 479' 480' 481' 482' 483' 484' 485' 486' 487' 488' 489' 489' 490' 491' 492' 493' 494' 495' 496' 497' 498' 498' 499' 499' 500' 500' 501' 502' 503' 504' 505' 506' 507' 508' 509' 509' 510' 511' 512' 513' 514' 515' 516' 517' 518' 519' 519' 520' 521' 522' 523' 524' 525' 526' 527' 528' 529' 529' 530' 531' 532' 533' 534' 535' 536' 537' 538' 539' 539' 540' 541' 542' 543' 544' 545' 546' 547' 548' 549' 549' 550' 551' 552' 553' 554' 555' 556' 557' 558' 559' 559' 560' 561' 562' 563' 564' 565' 566' 567' 568' 569' 569' 570' 571' 572' 573' 574' 575' 576' 577' 578' 578' 579' 580' 581' 582' 583' 584' 585' 586' 587' 588' 589' 589' 590' 591' 592' 593' 594' 595' 596' 597' 598' 598' 599' 599' 600' 600' 601' 602' 603' 604' 605' 606' 607' 608' 609' 609' 610' 611' 612' 613' 614' 615' 616' 617' 618' 619' 619' 620' 621' 622' 623' 624' 625' 626' 627' 628' 629' 629' 630' 631' 632' 633' 634' 635' 636' 637' 638' 639' 639' 640' 641' 642' 643' 644' 645' 646' 647' 648' 649' 649' 650' 651' 652' 653' 654' 655' 656' 657' 658' 659' 659' 660' 661' 662' 663' 664' 665' 666' 667' 668' 669' 669' 670' 671' 672' 673' 674' 675' 676' 677' 678' 678' 679' 680' 681' 682' 683' 684' 685' 686' 687' 688' 689' 689' 690' 691' 692' 693' 694' 695' 696' 697' 698' 698' 699' 699' 700' 700' 701' 702' 703' 704' 705' 706' 707' 708' 709' 709' 710' 711' 712' 713' 714' 715' 716' 717' 718' 719' 719' 720' 721' 722' 723' 724' 725' 726' 727' 728' 729' 729' 730' 731' 732' 733' 734' 735' 736' 737' 738' 739' 739' 740' 741' 742' 743' 744' 745' 746' 747' 748' 749' 749' 750' 751' 752' 753' 754' 755' 756' 757' 758' 759' 759' 760' 761' 762' 763' 764' 765' 766' 767' 768' 769' 769' 770' 771' 772' 773' 774' 775' 776' 777' 778' 778' 779' 779' 780' 780' 781' 782' 783' 784' 785' 786' 787' 788' 788' 789' 789' 790' 790' 791' 792' 793' 794' 795' 796' 797' 798' 798' 799' 799' 800' 800' 801' 802' 803' 804' 805' 806' 807' 808' 809' 809' 810' 811' 812' 813' 814' 815' 816' 817' 818' 819' 819' 820' 821' 822' 823' 824' 825' 826' 827' 828' 829' 829' 830' 831' 832' 833' 834' 835' 836' 837' 838' 839' 839' 840' 841' 842' 843' 844' 845' 846' 847' 848' 849' 849' 850' 851' 852' 853' 854' 855' 856' 857' 858' 859' 859' 860' 861' 862' 863' 864' 865' 866' 867' 868' 869' 869' 870' 871' 872' 873' 874' 875' 876' 877' 878' 878' 879' 879' 880' 880' 881' 882' 883' 884' 885' 886' 887' 888' 888' 889' 889' 890' 890' 891' 892' 893' 894' 895' 896' 897' 898' 898' 899' 899' 900' 900' 901' 902' 903' 904' 905' 906' 907' 908' 909' 909' 910' 911' 912' 913' 914' 915' 916' 917' 918' 919' 919' 920' 921' 922' 923' 924' 925' 926' 927' 928' 929' 929' 930' 931' 932' 933' 934' 935' 936' 937' 938' 939' 939' 940' 941' 942' 943' 944' 945' 946' 947' 948' 949' 949' 950' 951' 952' 953' 954' 955' 956' 957' 958' 959' 959' 960' 961' 962' 963' 964' 965' 966' 967' 968' 969' 969' 970' 971' 972' 973' 974' 975' 976' 977' 978' 978' 979' 979' 980' 980' 981' 982' 983' 984' 985' 986' 987' 988' 988' 989' 989' 990' 990' 991' 992' 993' 994' 995' 996' 997' 998' 998' 999' 999' 1000' 1000' 1001' 1002' 1003' 1004' 1005' 1006' 1007' 1008' 1009' 1009' 1010' 1011' 1012' 1013' 1014' 1015' 1016' 1017' 1018' 1019' 1019' 1020' 1021' 1022' 1023' 1024' 1025' 1026' 1027' 1028' 1029' 1029' 1030' 1031' 1032' 1033' 1034' 1035' 1036' 1037' 1038' 1039' 1039' 1040' 1041' 1042' 1043' 1044' 1045' 1046' 1047' 1048' 1049' 1049' 1050' 1051' 1052' 1053' 1054' 1055' 1056' 1057' 1058' 1059' 1059' 1060' 1061' 1062' 1063' 1064' 1065' 1066' 1067' 1068' 1069' 1069' 1070' 1071' 1072' 1073' 1074' 1075' 1076' 1077' 1078' 1078' 1079' 1079' 1080' 1080' 1081' 1082' 1083' 1084' 1085' 1086' 1087' 1088' 1088' 1089' 1089' 1090' 1090' 1091' 1092' 1093' 1094' 1095' 1096' 1097' 1097' 1098' 1098' 1099' 1099' 1100' 1100' 1101' 1102' 1103' 1104' 1105' 1106' 1107' 1108' 1109' 1109' 1110' 1111' 1112' 1113' 1114' 1115' 1116' 1117' 1118' 1119' 1119' 1120' 1121' 1122' 1123' 1124' 1125' 1126' 1127' 1128' 1129' 1129' 1130' 1131' 1132' 1133' 1134' 1135' 1136' 1137' 1138' 1139' 1139' 1140' 1141' 1142' 1143' 1144' 1145' 1146' 1147' 1148' 1149' 1149' 1150' 1151' 1152' 1153' 1154' 1155' 1156' 1157' 1158' 1159' 1159' 1160' 1161' 1162' 1163' 1164' 1165' 1166' 1167' 1168' 1169' 1169' 1170' 1171' 1172' 1173' 1174' 1175' 1176' 1177' 1178' 1178' 1179' 1179' 1180' 1180' 1181' 1182' 1183' 1184' 1185' 1186' 1187' 1188' 1188' 1189' 1189' 1190' 1190' 1191' 1192' 1193' 1194' 1195' 1196' 1197' 1197' 1198' 1198' 1199' 1199' 1200' 1200' 1201' 1202' 1203' 1204' 1205' 1206' 1207' 1208' 1209' 1209' 1210' 1211' 1212' 1213' 1214' 1215' 1216' 1217' 1218' 1219' 1219' 1220' 1221' 1222' 1223' 1224' 1225' 1226' 1227' 1228' 1229' 1229' 1230' 1231' 1232' 1233' 1234' 1235' 1236' 1237' 1238' 1239' 1239' 1240' 1241' 1242' 1243' 1244' 1245' 1246' 1247' 1248' 1249' 1249' 1250' 1251' 1252' 1253' 1254' 1255' 1256' 1257' 1258' 1259' 1259' 1260' 1261' 1262' 1263' 1264' 1265' 1266' 1267' 1268' 1269' 1269' 1270' 1271' 1272' 1273' 1274' 1275' 1276' 1277' 1278' 1278' 1279' 1279' 1280' 1280' 1281' 1282' 1283' 1284' 1285' 1286' 1287' 1288' 1288' 1289' 1289' 1290' 1290' 1291' 1292' 1293' 1294' 1295' 1296' 1297' 1297' 1298' 1298' 1299' 1299' 1300' 1300' 1301' 1302' 1303' 1304' 1305' 1306' 1307' 1308' 1309' 1309' 1310' 1311' 1312' 1313' 1314' 1315' 1316' 1317' 1318' 1319' 1319' 1320' 1321' 1322' 1323' 1324' 1325' 1326' 1327' 1328' 1329' 1329' 1330' 1331' 1332' 1333' 1334' 1335' 1336' 1337' 1338' 1339' 1339' 1340' 1341' 1342' 1343' 1344' 1345' 1346' 1347' 1348' 1349' 1349' 1350' 1351' 1352' 1353' 1354' 1355' 1356' 1357' 1358' 1359' 1359' 1360' 1361' 1362' 1363' 1364' 1365' 1366' 1367' 1368' 1369' 1369' 1370' 1371' 1372' 1373' 1374' 1375' 1376' 1377' 1378' 1378' 1379' 1379' 1380' 1380' 1381' 1382' 1383' 1384' 1385' 1386' 1387' 1388' 1388' 1389' 1389' 1390' 1390' 1391' 1392' 1393' 1394' 1395' 1396' 1397' 1397' 1398' 1398' 1399' 1399' 1400' 1400' 1401' 1402' 1403' 1404' 1405' 1406' 1407' 1408' 1409' 1409' 1410' 1411' 1412' 1413' 1414' 1415' 1416' 1417' 1418' 1419' 1419' 1420' 1421' 1422' 1423' 1424' 1425' 1426' 1427' 1428' 1429' 1429' 1430' 1431' 1432' 1433' 1434' 1435' 1436' 1437' 1438' 1439' 1439' 1440' 1441' 1442' 1443' 1444' 1445' 1446' 1447' 1448' 1449' 1449' 1450' 1451' 1452' 1453' 1454' 1455' 1456' 1457' 1458' 1459' 1459' 1460' 1461' 1462' 1463' 1464' 1465' 1466' 1467' 1468' 1469' 1469' 1470' 1471' 1472' 1473' 1474' 1475' 1476' 1477' 1478' 1478' 1479' 1479' 1480' 1480' 1481' 1482' 1483' 1484' 1485' 1486' 1487' 1488' 1488' 1489' 1489' 1490' 1490' 1491' 1492' 1493' 1494' 1495' 1496' 1497' 1497' 1498' 1498' 1499' 1499' 1500' 1500' 1501' 1502' 1503' 1504' 1505' 1506' 1507' 1508' 1509' 1509' 1510' 1511' 1512' 1513' 1514' 1515' 1516' 1517' 1518' 1519' 1519' 1520' 1521' 1522' 1523' 1524' 1525' 1526' 1527' 1528' 1529' 1529' 1530' 1531' 1532' 1533' 1534' 1535' 1536' 1537' 1538' 1539' 1539' 1540' 1541' 1542' 1543' 1544' 1545' 1546' 1547' 1548' 1549' 1549' 1550' 1551' 1552' 1553' 1554' 1555' 1556' 1557' 1558' 1559' 1559' 1560' 1561' 1562' 1563' 1564' 1565' 1566' 1567' 1568' 1569' 1569' 1570' 1571' 1572' 1573' 1574' 1575' 1576' 1577' 1578' 1578' 1579' 1579' 1580' 1580' 1581' 1582' 1583' 1584' 1585' 1586' 1587' 1588' 1588' 1589' 1589' 1590' 1590' 1591' 1592' 1593' 1594' 1595' 1596' 1597' 1597' 1598' 1598' 1599' 1599' 1600' 1600' 1601' 1602' 1603' 1604' 1605' 1606' 1607' 1608' 1609' 1609' 1610' 1611' 1612' 1613' 1614' 1615' 1616' 1617' 1618' 1619' 1619' 1620' 1621' 1622' 1623' 1624' 1625' 1626' 1627' 1628' 1629' 1629' 1630' 1631' 1632' 1633' 1634' 1635' 1636' 1637' 1638' 1639' 1639' 1640' 1641' 1642' 1643' 1644' 1645' 1646' 1647' 1648' 1649' 1649' 1650' 1651' 1652' 1653' 1654' 1655' 1656' 1657' 1658' 1659' 1659' 1660' 1661' 1662' 1663' 1664' 1665' 1666' 1667' 1668' 1669' 1669' 1670' 1671' 1672' 1673' 1674' 1675' 1676' 1677' 1678' 1678' 1679' 1679' 1680' 1680' 1681' 1682' 1683' 1684' 1685' 1686' 1687' 1688' 1688' 1689' 1689' 1690' 1690' 1691' 1692' 1693' 1694' 1695' 1696' 1697' 1697' 1698' 1698' 1699' 1699' 1700' 1700' 1701' 1702' 1703' 1704' 1705' 1706' 1707' 1708' 1709' 1709' 1710' 1711' 1712' 1713' 1714' 1715' 1716' 1717' 1718' 1719' 1719' 1720' 1721' 1722' 1723' 1724' 1725' 1726' 1727' 1728' 1729' 1729' 1730' 1731' 1732' 1733' 1734' 1735' 1736' 1737' 1738' 1739' 1739' 1740' 1741' 1742' 1743' 1744' 1745' 1746' 1747' 1748' 1749' 1749' 1750' 1751' 1752' 1753' 1754' 1755' 1756' 1757' 1758' 1759' 1759' 1760' 1761' 1762' 1763' 1764' 1765' 1766' 1767' 1768' 1769' 1769' 1770' 1771' 1



cash

192.168.1.4 /24 and 192.168.1.4 /30  
are different address

192.168.1.00000100      192.168.1.00000000      Host bit  
124      Host address      130

All Host sites

( Network addresses )

→ To calculate address subnet is given.

~~♀~~ GrVAn N/w address

192.168.10.4 / 30

identify the entire IP address pool with broadcast address -

$$192.168.10.00008100 / 30 \Rightarrow 192.168.10.4 \Rightarrow \text{node M}$$

192.168.10.00000101 { usable host address  
192.168.10.00000110

192.168.10.00000110 )  
192.168.10.00000111 ⇒ 192.168.10.7 ⇒ Broadcast  
192.168.10.00000112 )

9 192. 168. 5. 0 / 28  
193. 168. 5. 0

192.168.5.00000000 ⇒ 192.168.

192.168.5.0000001 → 192.168.5.0 → n/w address

192.168.5.0000 1110 → usable host address

$$192 \cdot 168 \cdot 5 \cdot 0000\ 1110 \Rightarrow 192 \cdot 168 \cdot 5 \cdot 14$$

$$192.168.5.00001111 \Rightarrow 192.168.5.15 \Rightarrow \text{N/w address}$$

classmate

Date \_\_\_\_\_

Page \_\_\_\_\_

② 192.16.1.0/27

192.16.1.00000000  $\Rightarrow$  192.16.1.0  $\Rightarrow$  N/W address

192.16.1.00011110  $\Rightarrow$  Usable addresses

192.16.1.00011110

192.16.1.00011111  $\Rightarrow$  192.16.1.31  $\Rightarrow$  Broadcast  
address

③ 202.166.216.136/29

202.166.216.

Checksum

Q Suppose the following block of 16 bits is sent using a checksum of 8 bits 10010100 ~~sender~~ 00110001. Compute the checksum and verify the transmission without any error. Suppose the LS13 of first segment is inverted show how the error is detected at the receiver's end.

sender

$$\Rightarrow \begin{array}{r} 10010100 \\ + 00110001 \\ \hline \text{sum} = 11000101 \end{array}$$

↓ 1's complement.

$$\text{sum} = 00111010$$

$$\text{checksum} = 00111010$$

Receiver

$$\begin{array}{r} 10010100 \\ 00110001 \\ 00111010 \\ \hline \text{sum: } 11111111 \end{array}$$

$$\text{Result: sum} = 00000000$$

Conclusion: No error detection since Result is zero

classmate

Date \_\_\_\_\_

Page \_\_\_\_\_

case II

Receiving

segment 1 1 0 0 1 0 1 0 1

segment 2 0 0 1 1 1 0 1 0

checksum 0 0 1 1 1 0 1 0

0 1 | 0 0 0 1 0 0 1  
+-----

\* Existing N/W of Pokhara University's

192.168.1.0/24

192.168.1.0.

↓ 192.168.1.31

000

192.168.1.32

↓ 192.168.1.83

001

192.168.1.64

↓ 192.168.1.95

010

192.168.1.96

↓ 192.168.1.127

128

School of engineering

School of mgmt.

School of medicine

School of law

Host = 20

Host = 25

Host = 19

Host = 17

192.168.1.0

↓ 192.168.1.15

192.168.1.16

↓ 192.168.1.31

Department 1

Department 2

Host = 10

Host = 10

Existing N/W

192.168.1.0/24

Host bit = 8

Total host =  $2^8 = 256$

Total usable host =  $256 - 2$

= 254

Subnet = /24

Subnet mask = 255.255.255.0

Now Requirement

4 school

Max Host  $\geq 25$

For 25 Hosts  $\geq$  Host bit = 5

$32 - 2 = 30$

Now Existing N/W of PU will be

192.168.1.0/24

192.168.1.00000000/24

AS per Host bit

192. 168. 1. 1000000000 / 24 + 3

/ 24 + 3      / 27

Now Subnet = /27

### 1. School of Engineering (000)

192. 168. 1. 1000000000 / 27  $\Rightarrow$  192. 168. 1. 0  $\rightarrow$  Network

/ 24 + 3      192. 168. 1. 1      2 Usable Host address  
192. 168. 1. 30

192. 168. 1. 00011111 / 27  $\Rightarrow$  192. 168. 1. 31  $\rightarrow$  broadcast

/ 27  $\Rightarrow$  255. 255. 255. 11100000

255. 255. 255. 224

wildcard mask

255. 255. 255. 255

• 255. 255. 255. 224

0 . 0 . 0 . 31

### 2. School of Management (001)

192. 168. 1. 0010000000 / 22  $\Rightarrow$  192. 168. 1. 32

/ 24 + 3

192. 168. 1. 00111111 / 27  $\Rightarrow$  192. 168. 1. 63

3. School of medicine (010)

192-168.

J  
26

192-168-1-010 00000/27  $\Rightarrow$  192-168-1-64

~~20~~  
2-1

192-168-1-01011111/27  $\Rightarrow$  192-168-1-127

Deposit 1

192-168

4. School of law (011)

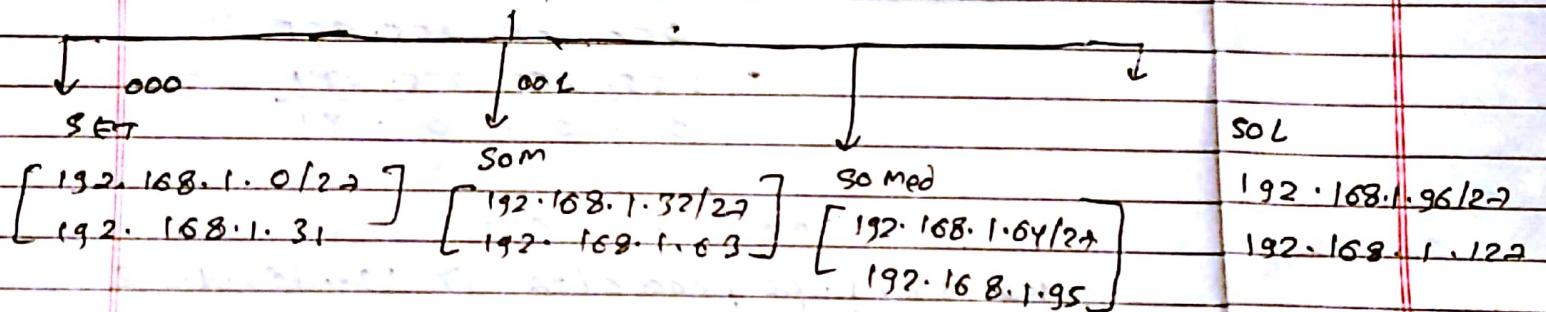
192-168.

192-168-1-01100000/27  $\Rightarrow$  192-168-1-36

192-168-1-0111111/27  $\Rightarrow$  192-168-1-127

Existing N/w of pokhara university

192-168-1-0124



For SET.

2 Department  $\Rightarrow$  2N/w

For 2N/w  $\Rightarrow$  N/w bit = 1

$$2^1 = 2$$

Existing N/w.

192-168-1-0127

192-168-1-000 00000/27

/27 (N/w)

$192 \cdot 168 \cdot 1 \cdot 000 \cdot 0 \cdot 000 / 27 + 1 = 1/28 (255 \cdot 255 \cdot 255 \cdot 111 \cdot 0000)$

$255 \cdot 255 \cdot 255 \cdot 240$

wildcard  $\not\exists 0 \cdot 0 \cdot 0 \cdot 15$

### Deposit 1

$192 \cdot 168 \cdot 1 \cdot 000 \cdot 0 \cdot 000 / 27 + 1 / 28 \ni 192 \cdot 168 \cdot 1 \cdot 0 / 28$

$192 \cdot 168 \cdot 1 \cdot 1 \quad \} \text{ usable}$

$192 \cdot 168 \cdot 1 \cdot 1 \quad \}$

$192 \cdot 168 \cdot 1 \cdot 000 \cdot 0 \cdot 111 \quad \Rightarrow 192 \cdot 168 \cdot 1 \cdot 15$

$1 / 28 \ni 255 \cdot 255 \cdot 255 \cdot 240$

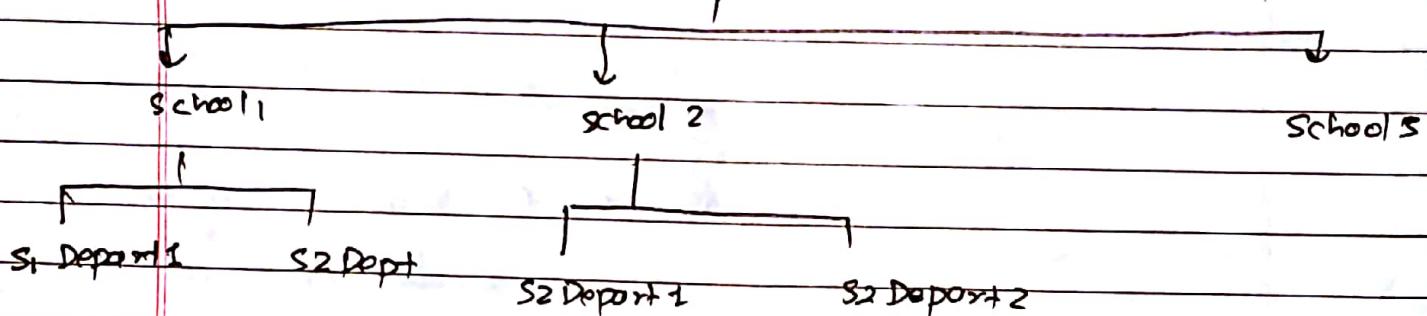
wildcard  $\not\exists 0 \cdot 0 \cdot 0 \cdot 15$

$2 \cdot 168 \cdot 1 \cdot 96 / 27$

$2 \cdot 168 \cdot 1 \cdot 122$

Q The existing network of Pokhara University (172.17.1.0/24) is to be divided into network of 3 different schools. Among 3 schools two schools need to be subdivided into 2 different departments. Provide a complete IP address plan which includes Network address, Broadcast Address, Usable IP pool, subnet mask and wildcard mask.

172.17.1.0/24



No. of schools = 3  $\Rightarrow$  3 subnets

N/w bit = 2

$$\text{Total N/w} = 2^2 = 4$$

Now, N/w

172.17.1.100.000000 /24 + 2

/24 + 2  $\downarrow$  total bit = 6

$$\text{total host} = 2^6 = 64$$

$$\text{usable} = 62$$

$$/26 \Rightarrow 255.255.255.11000000$$

$$\Rightarrow 255.255.255.192 \quad [\text{subnet mask}]$$

89  
88  
87  
86  
85

111111 → ?

classmate  
Date \_\_\_\_\_  
Page \_\_\_\_\_

### wildcard mask

$$\begin{array}{r}
 255. 255. 255. 255 \\
 - 255. 255. 255. 192 \\
 \hline
 0. 0. 0. 63
 \end{array}$$

### School 1 (00)

*Network address*

192.168.1.100 000000 /26 → 192.168.1.0

usable pool { 192.168.1.1 } } usable IP  
 192.168.1.62 } 192.168.1.63 } broadcast address

### School 2 (01)

192.168.1.101 000000 /26 → 192.168.1.64

192.168.1.65 } usable pool

192.168.1.126 }

+ 192.168.1.000000 /

192.168.1.011111 → 192.168.1.127  
 128 - 1

### School 3 (10)

192.168.1.1100000 /26 → 192.168.1.128

192.168.1.129 } usable

192.168.1.190 }

192.168.1.101111 /26 → 192.168.1.191

63

128

191

111111

01111

$$\begin{array}{r}
 128 \\
 64 \\
 + 32 \\
 \hline
 224
 \end{array}$$

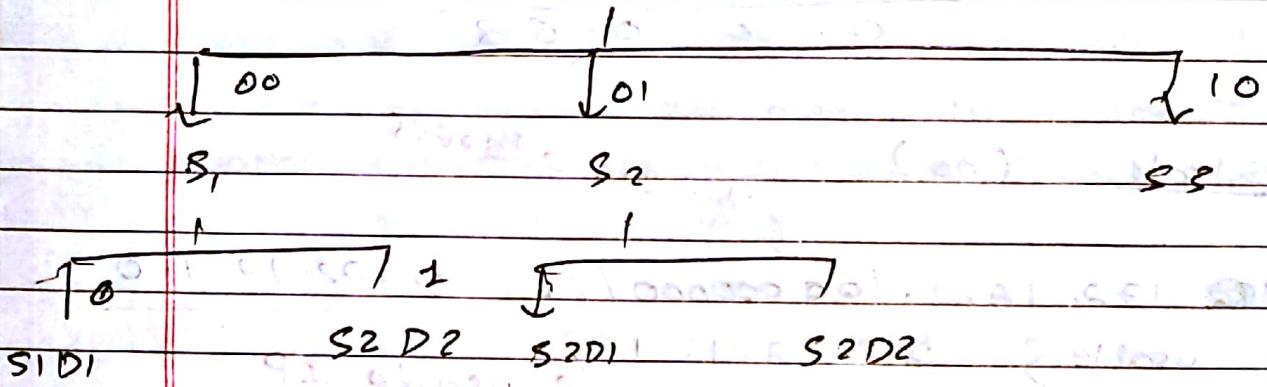
classmate

Date

Page

Department of school

172.17.1.0/24



S2  $\Rightarrow$  172.17.1.0/26  $\rightarrow$  172.17.1.1 - 172.17.1.7

2 Depart  $\Rightarrow$  2 N/w  $\rightarrow$  255.255.255.11100000

N/w bit = 1

255.255.255.240

$2^1 = 2$

0.0.0.1-51

New N/w

172.17.1.00  $\underline{0000000}$  /26+1 = 27

172.17.1.00  $\underline{10}111111$

Department

172.17.1.00000000 /26+1 = 27  $\leftarrow$  N/w address

172.17.1.01

172.17.1.02  $\leftarrow$  usable Address

172.17.1.03

172.17.1.35  $\leftarrow$  broadcast address

172.17.1.1110111

172.17

Department 2

172.17.1.00010000/27 = 172.17.1.16

172.17.1.127

172.17.1.30

172.17.1.00011111

172.17.1.81 ← board

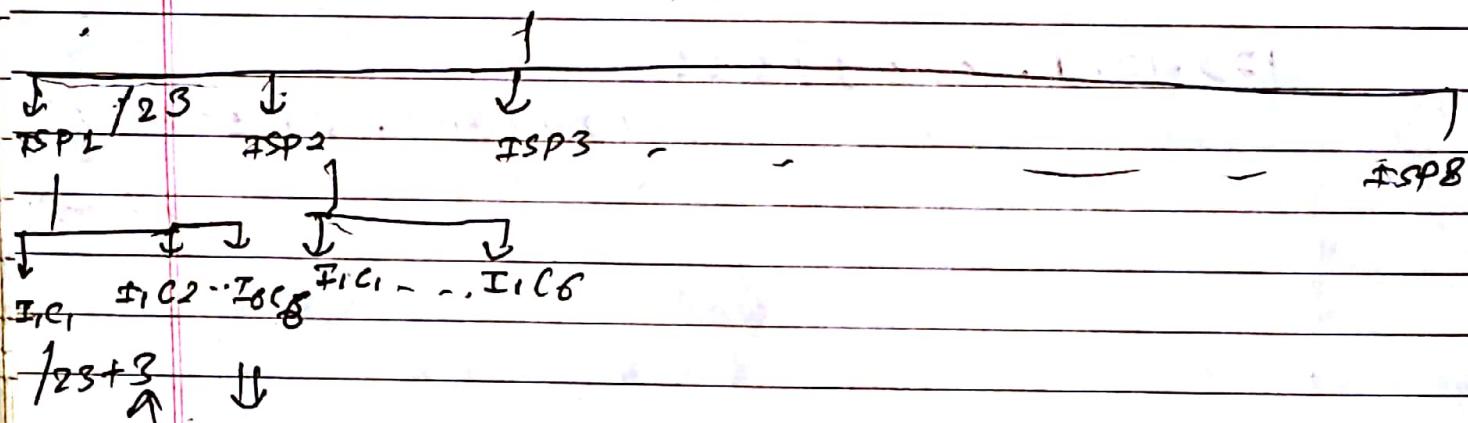
cost

address

Qn ② The Asia Pacific N/w information centre (APNIC) has to provide service to 8 local ISPs from the network pool of 17.10.0.0/20 from the available pool each local ISP has to provide to their six (6) dedicated clients

↓

17.10.0.0/20



$$\text{Clients} = 6 \Rightarrow \text{subnets} = 6$$

$$\text{Total n/w} = 6$$

$$\text{n/w bit} = 3$$

## 7. Memento

- capture and restore an objects internal state.

computer Network

IPV6



128



$$2^{128} = 3.4 \times 10^{38} \text{ Address space}$$



Represented in hex colon

128 bit  $\rightarrow$  Hex

32 Hex



8 blocks [Every blocks and then separated with colon]

0000 : 0000 : 0000 : 0000 : 0000 : 0000 : 0000 : 0000

FFFF : FFFF

more

IPV6 : Abbreviated address

Abbreviated

FDFF : 0000 : 0000 : 0000 : 0000 : BBFF : 0000 : FFFF

FDFF : 0 : 0 : 0 : 0 : BBFF : 0 : FFFF

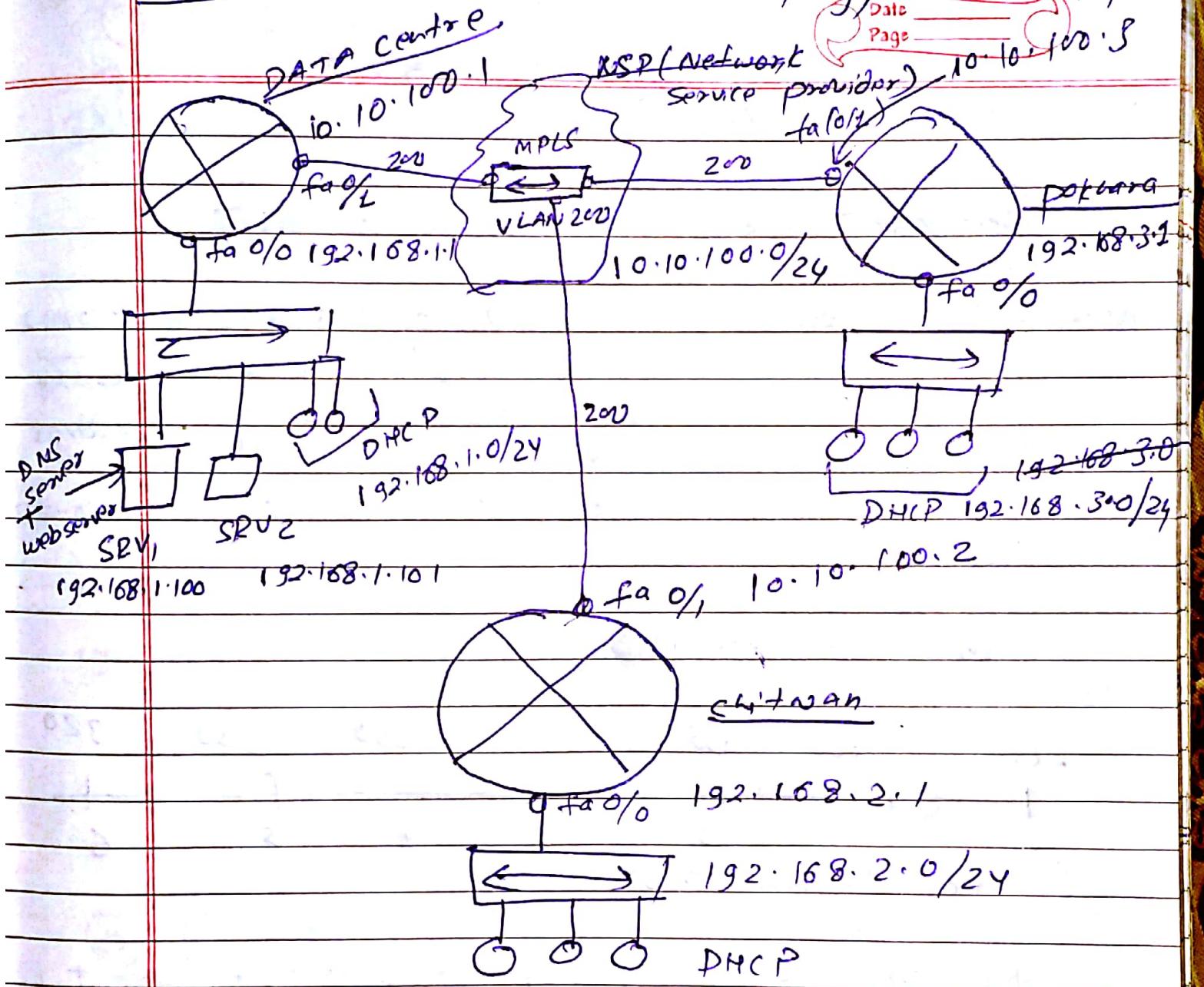
More Abbreviated

FDFF :: BBFF : 0 : FFFF

↑ we use it it's one time otherwise unambiguous occur

## C.N (Lab-2)

## Network Topology (class A/B/C copy)



DNS Default

exp. abc.com.np  $\Rightarrow$  192.168.1.100

mis. abc.com.np  $\Rightarrow$  192.168.1.101

192.168.1.100  $\Rightarrow$  DNS + web

192.168.1.101  $\Rightarrow$  web + FTP

class - 100%

## Routing (static Routing)

Data centre (config) # ip route 192.168.2.0

DATA CENTER (config) # ip route 192.168.2.0 255.255.255.0 b.10.100.2

Destination	Destination	Next hop
n/w	subnet mask	address

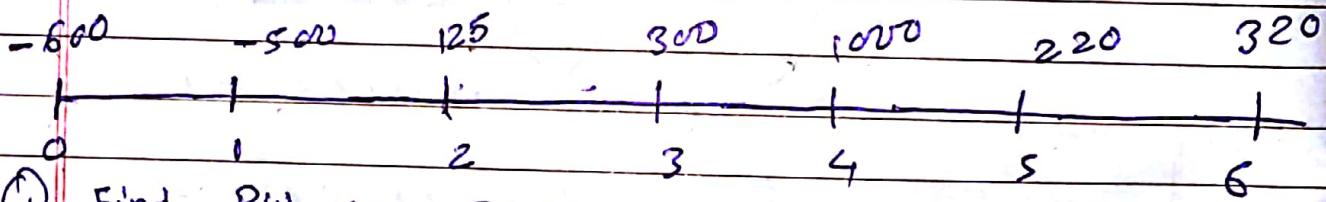
path to

# ip route 192.168.3.0 255.255.255.0 10.10.100.2

Economic - 2017 - Fall.

Q.

$i = 0.1$



(1) Find PW, AW, FW

$$\begin{aligned} NPW \Rightarrow & -600 - \frac{500}{1.1^0} + \frac{125}{1.1^1} + \frac{300}{1.1^2} + \frac{1000}{1.1^3} + \\ & \frac{220}{1.1^4} + \frac{320}{1.1^5} \end{aligned}$$

$$= 274.457$$

AW  $\Rightarrow$ 

$$NFW = \frac{F/P}{i} = P(i+i)^{-N}$$

$$NFW = (F/P, i, N) A(F/A, i, N) - 600(A/P, i, N)$$