HW - Chapter 7 - Capital Budgeting- Q4

(a)

(i)   Payback Period

Project A: Rs. 10,000 ÷ Rs. 10,000   = 1 year

Project B: Rs. 10,000 ÷ Rs. 7,500   = 1.33 years

Project C: 2 years+ 4,000 ÷ 12000 = 2.33 years

Project D: 1 year

(ii)   ARR (Figures in Rs.)

Average Cash Flows = Cash flow of each year ÷ Life

Project A: 10,000 ÷ 1 = Rs. 10,000

Project B: 7,500 + 7500 ÷ 2 = Rs. 7,500

Project C: 2,000 + 4000 + 12,000 ÷ 3 = Rs. 6000

Project D: 10,000 + 3000 + 3000 ÷ 3 = 5,333

Depreciation

Project A: 10,000 ÷ 1 = Rs. 10,000

Project B: 10,000 ÷ 2 = Rs. 5,000

Project C: 10,000 ÷ 3 = Rs. 3,333

Project D: 10,000 ÷ 3 = Rs. 3,333

Average PAT = Average Cash Flows i.e. Sales less VC less FC - Depreciation

Project A: 10,000 - Rs. 10,000 = Rs. 0

Project B: 7,500 - 5000 = Rs. 2,500

Project C: 6000 - 3333 - Rs. 2667

Project D: 5,333 - 3333 = Rs 2,000

ARR = Average PAT ÷ Average investment x 100

Project A: Rs. 0 ÷ 5,000 = 0%

Project B: Rs. 2,500 ÷ 5,000 = 50%

Project C: Rs. 2667 ÷ 5,000 = 53%

Project D: Rs 2,000 ÷ 5,000 = 40%

(iii)   IRR

Project A:	The net cash proceeds in year 1 are just equal to investment. Therefore, r = 0%.
Project B:	This project produces an annuity of Rs. 7,500 for two years. Therefore, the required PVAF is: Rs. 10,000/Rs. 7,500 = 1.33. This factor is found under the 32% column. Therefore, r = 32%

Project C:	Since cash flows are uneven, the trial and error method will be followed. Using 20% rate of discount, the NPV is + Rs. 1,389. At a 30% rate of discount, the NPV is - Rs. 633. The true rate of return should be less than 30%. At 27% rate of discount, it is found that the NPV is - Rs. 86 and +Rs. 105 at 26%. Through interpolation, we find r = 26.5%
Project D:	In this case also by using the trial and error method, it is found that at 37.6% rate of discount, NPV becomes almost zero. Therefore, r = 37.6%.

(iv)   NPV

Project A: at 10% = -10,000+10,000×0.909 = -910
              at 30% = -10,000+10,000×0.769 = -2,310

Project B: at 10% = -10,000+7,500(0.909+0.826) = +3,013
              at 30% = -10,000+7,500(0.769+0.592) = +208

Project C: at 10% = -10,000+2,000×0.909+4,000×0.826+12,000×0.751= +4,134
              at 30% = -10,000+2,000×0.769+4,000×0.592+12,000×0.455 =-633

Project D: at 10% = -10,000+10,000×0.909+3,000×(0.826+0.751) =+ 3,821
              at 30% = -10,000+10,000×0.769+3,000×(0.592+0.455) =+ 831

The projects are ranked as follows according to the various methods:

Projects	PBP	ARR	IRR	NPV (10%)	NPV (30%)
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

(b)   Payback and ARR are theoretically unsound methods for choosing between the investment projects.

Between the two time-adjusted (DCF) investment criteria, NPV and IRR, NPV gives consistent results. If the projects are independent (and there is no capital rationing), either IRR or NPV can be used since the same set of projects will be accepted by any of the methods. In the present case, except Project A all the three projects should be accepted if the discount rate is 10%. Only Projects B and D should be undertaken if the discount rate is 30%.

If it is assumed that the projects are mutually exclusive, then under the assumption of a 30% discount rate, the choice is between B and D (A and C are unprofitable). Both criteria IRR and NPV give the same results – D is the best. Under the assumption of 10% discount rate, ranking according to IRR and NPV conflict (except for Project A). If the IRR rule is followed, Project D should be accepted. But the NPV rule tells that Project C is the best. The NPV rule generally gives consistent results in conformity with the wealth maximization principle. Therefore, Project C should be accepted following the NPV rule.