**EASTERN UNIVERSITY, SRI LANKA**

# SPECIAL REPEAT EXAMINATION

**FINAL YEAR 1ST SEMESTER EXAMINATION IN AGRICULTURE – July 2019**

**EC 4101: PROJECT PLANNING AND INVESTMENT ANALYSIS**

**PRACTICAL EXAMINATION**

Time: **02 hour** Answer **ALL** questions.

1. a) How is the Discount Factor decided for discounting cash flows?
   b) Write the Discount Factor formula, using standard notations.
   c) What is the purpose of the Discount Factor Table in project appraisal?
   d) If you wish to obtain Rs.500,000 after 10 years, what is the amount of money that has to be invested currently at 8% per year interest rate? **(20 marks)**

2. Gayaani FOODS (Pvt.) Ltd. is considering an investment program of Rs.60 Mn. It has a choice of three projects (A,B & C) each of which cost Rs.30 Mn. The firm expects a minimum return of 10% on capital invested.

| **Project A** | **Project B** | **Project C** |
|---|---|---|
| Ice Cream Making | Fresh Milk Packets | Prawn Packaging |

Forecasted **Net Cash (Benefits – Costs) Flows** (Rs.Mn) for the Projects are shown below.

| Year | Project A | Project B | Project C |
|---|---|---|---|
| 0 | 30 | 30 | 30 |
| 1 | 12 | 18 | 24 |
| 2 | 21 | 12 | 27 |
| 3 | 27 | 21 | 15 |
| 4 | 15 | 21 | 15 |
| 5 | 21 | 19.5 | 15 |

Discount factors (DF) at 10% are provided in the Discount Factor table attached.

Using the above information perform an **investment appraisal of the 3 projects** using the **Net Present Value (NPV) approach** and identify which of the projects can be recommended for investment to the firm. Justify your answer clearly. **(30 marks)**

3. Renuka Agric. Ltd. is interested in investing in a paddy mill to process raw paddy into rice for sale to consumers locally. The total investment on the Rice Mill is Rs.6 million. The rice mill has a life time of 20 years of operation and the benefits are the sale of milled rice packets and rice bran & husks. Details of the rice mill investment and operations are shown in the Table below.

| Year | Construction Costs | Operating Costs | Sale of Rice packets | Sale of Rice Bran & Husks |
|---|---|---|---|---|
| 1 | 3,000,000 | 0 | 0 | 0 |
| 2 | 3,000,000 | 0 | 0 | 0 |
| 3 | 0 | 200,000 | 500,000 | 100,000 |
| 4 | 0 | 200,000 | 500,000 | 100,000 |
| 5 | 0 | 200,000 | 500,000 | 100,000 |
| 6 | 0 | 200,000 | 500,000 | 100,000 |
| 7 | 0 | 200,000 | 600,000 | 150,000 |
| 8 | 0 | 300,000 | 700,000 | 150,000 |
| 9 | 0 | 300,000 | 700,000 | 150,000 |
| 10 | 0 | 400,000 | 700,000 | 150,000 |
| 11 ↓ | 0 ↓ | 400,000 ↓ | 800,000 ↓ | 150,000 ↓ |
| 20 | 0 | 400,000 | 800,000 | 150,000 |

Using the above information about the Rice Mill investment combined with a discount rate of 6% (Discount factor table is provided);

i) Calculate the **Net Present Value (NPV)** and **Benefit Cost Ratio (BCR)** and

ii) Estimate the **Internal Rate of Return (IRR)** of the investment.

**(30 marks)**

4. The Table below shows the **Activity Chart** for a project which indicates the activities/tasks, tasks duration, dependencies and the milestones.

| Activity / Tasks | Duration (Weeks) | Dependencies |
|---|---|---|
| T1 | 8 | - |
| T2 | 15 | - |
| T3 | 15 | T1 (M1) |
| T4 | 10 | - |
| T5 | 10 | T2, T4 (M2) |
| T6 | 5 | T1, T2 (M3) |
| T7 | 20 | T1 (M1) |
| T8 | 25 | T4 (M5) |
| T9 | 15 | T3, T6 (M4) |
| T10 | 15 | T5, T7 (M7) |
| T11 | 7 | T9 (M6) |
| T12 | 10 | T11 (M8) |

Using the above data of the project; answer the following questions.

i) What is the minimum total duration of this project?

ii) Draw the **GANTT Chart** /Activity Bar Chart showing all the activities/tasks.

iii) Draw the **Activity Network diagram** clearly showing all the tasks, dependencies and milestones.

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# Discount Factor Table

## DISCOUNT FACTOR (p.a.) FOR A RANGE OF DISCOUNT RATES

Present Value of $1 in the Future at Discount Rate r%

| Year | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% | 14% | 15% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 |
| 2 | 0.9426 | 0.9246 | 0.9070 | 0.8900 | 0.8734 | 0.8573 | 0.8417 | 0.8264 | 0.8116 | 0.7972 | 0.7831 | 0.7695 | 0.7561 |
| 3 | 0.9151 | 0.8890 | 0.8638 | 0.8396 | 0.8163 | 0.7938 | 0.7722 | 0.7513 | 0.7312 | 0.7118 | 0.6931 | 0.6750 | 0.6575 |
| 4 | 0.8885 | 0.8548 | 0.8227 | 0.7921 | 0.7629 | 0.7350 | 0.7084 | 0.6830 | 0.6587 | 0.6355 | 0.6133 | 0.5921 | 0.5718 |
| 5 | 0.8626 | 0.8219 | 0.7835 | 0.7473 | 0.7130 | 0.6806 | 0.6499 | 0.6209 | 0.5935 | 0.5674 | 0.5428 | 0.5194 | 0.4972 |
| 6 | 0.8375 | 0.7903 | 0.7462 | 0.7050 | 0.6663 | 0.6302 | 0.5963 | 0.5645 | 0.5346 | 0.5066 | 0.4803 | 0.4556 | 0.4323 |
| 7 | 0.8131 | 0.7599 | 0.7107 | 0.6651 | 0.6227 | 0.5835 | 0.5470 | 0.5132 | 0.4817 | 0.4523 | 0.4251 | 0.3996 | 0.3759 |
| 8 | 0.7894 | 0.7307 | 0.6768 | 0.6274 | 0.5820 | 0.5403 | 0.5019 | 0.4665 | 0.4339 | 0.4039 | 0.3762 | 0.3506 | 0.3269 |
| 9 | 0.7664 | 0.7026 | 0.6446 | 0.5919 | 0.5439 | 0.5002 | 0.4604 | 0.4241 | 0.3909 | 0.3606 | 0.3329 | 0.3075 | 0.2843 |
| 10 | 0.7441 | 0.6756 | 0.6139 | 0.5584 | 0.5083 | 0.4632 | 0.4224 | 0.3855 | 0.3522 | 0.3220 | 0.2946 | 0.2697 | 0.2472 |
| 11 | 0.7224 | 0.6496 | 0.5847 | 0.5268 | 0.4751 | 0.4289 | 0.3875 | 0.3505 | 0.3173 | 0.2875 | 0.2607 | 0.2366 | 0.2149 |
| 12 | 0.7014 | 0.6246 | 0.5568 | 0.4970 | 0.4440 | 0.3971 | 0.3555 | 0.3186 | 0.2858 | 0.2567 | 0.2307 | 0.2076 | 0.1869 |
| 13 | 0.6810 | 0.6006 | 0.5303 | 0.4688 | 0.4150 | 0.3677 | 0.3262 | 0.2897 | 0.2575 | 0.2292 | 0.2042 | 0.1821 | 0.1625 |
| 14 | 0.6611 | 0.5775 | 0.5051 | 0.4423 | 0.3878 | 0.3405 | 0.2992 | 0.2633 | 0.2320 | 0.2046 | 0.1807 | 0.1597 | 0.1413 |
| 15 | 0.6419 | 0.5553 | 0.4810 | 0.4173 | 0.3624 | 0.3152 | 0.2745 | 0.2394 | 0.2090 | 0.1827 | 0.1599 | 0.1401 | 0.1229 |
| 16 | 0.6232 | 0.5339 | 0.4581 | 0.3936 | 0.3387 | 0.2919 | 0.2519 | 0.2176 | 0.1883 | 0.1631 | 0.1415 | 0.1229 | 0.1069 |
| 17 | 0.6050 | 0.5134 | 0.4363 | 0.3714 | 0.3166 | 0.2703 | 0.2311 | 0.1978 | 0.1696 | 0.1456 | 0.1252 | 0.1078 | 0.0929 |
| 18 | 0.5874 | 0.4936 | 0.4155 | 0.3503 | 0.2959 | 0.2502 | 0.2120 | 0.1799 | 0.1528 | 0.1300 | 0.1108 | 0.0946 | 0.0808 |
| 19 | 0.5703 | 0.4746 | 0.3957 | 0.3305 | 0.2765 | 0.2317 | 0.1945 | 0.1635 | 0.1377 | 0.1161 | 0.0981 | 0.0829 | 0.0703 |
| 20 | 0.5537 | 0.4564 | 0.3769 | 0.3118 | 0.2584 | 0.2145 | 0.1784 | 0.1486 | 0.1240 | 0.1037 | 0.0868 | 0.0728 | 0.0611 |
| 21 | 0.5375 | 0.4388 | 0.3589 | 0.2942 | 0.2415 | 0.1987 | 0.1637 | 0.1351 | 0.1117 | 0.0926 | 0.0768 | 0.0638 | 0.0531 |
| 22 | 0.5219 | 0.4220 | 0.3418 | 0.2775 | 0.2257 | 0.1839 | 0.1502 | 0.1228 | 0.1007 | 0.0826 | 0.0680 | 0.0560 | 0.0462 |
| 23 | 0.5067 | 0.4057 | 0.3256 | 0.2618 | 0.2109 | 0.1703 | 0.1378 | 0.1117 | 0.0907 | 0.0738 | 0.0601 | 0.0491 | 0.0402 |
| 24 | 0.4919 | 0.3901 | 0.3101 | 0.2470 | 0.1971 | 0.1577 | 0.1264 | 0.1015 | 0.0817 | 0.0659 | 0.0532 | 0.0431 | 0.0349 |
| 25 | 0.4776 | 0.3751 | 0.2953 | 0.2330 | 0.1842 | 0.1460 | 0.1160 | 0.0923 | 0.0736 | 0.0588 | 0.0471 | 0.0378 | 0.0304 |
| 26 | 0.4637 | 0.3607 | 0.2812 | 0.2198 | 0.1722 | 0.1352 | 0.1064 | 0.0839 | 0.0663 | 0.0525 | 0.0417 | 0.0331 | 0.0264 |
| 27 | 0.4502 | 0.3468 | 0.2678 | 0.2074 | 0.1609 | 0.1252 | 0.0976 | 0.0763 | 0.0597 | 0.0469 | 0.0369 | 0.0291 | 0.0230 |
| 28 | 0.4371 | 0.3335 | 0.2551 | 0.1956 | 0.1504 | 0.1159 | 0.0895 | 0.0693 | 0.0538 | 0.0419 | 0.0326 | 0.0255 | 0.0200 |
| 29 | 0.4243 | 0.3207 | 0.2429 | 0.1846 | 0.1406 | 0.1073 | 0.0822 | 0.0630 | 0.0485 | 0.0374 | 0.0289 | 0.0224 | 0.0174 |
| 30 | 0.4120 | 0.3083 | 0.2314 | 0.1741 | 0.1314 | 0.0994 | 0.0754 | 0.0573 | 0.0437 | 0.0334 | 0.0256 | 0.0196 | 0.0151 |
| 31 | 0.4000 | 0.2965 | 0.2204 | 0.1643 | 0.1228 | 0.0920 | 0.0691 | 0.0521 | 0.0394 | 0.0298 | 0.0226 | 0.0172 | 0.0131 |
| 32 | 0.3883 | 0.2851 | 0.2099 | 0.1550 | 0.1147 | 0.0852 | 0.0634 | 0.0474 | 0.0355 | 0.0266 | 0.0200 | 0.0151 | 0.0114 |
| 33 | 0.3770 | 0.2741 | 0.1999 | 0.1462 | 0.1072 | 0.0789 | 0.0582 | 0.0431 | 0.0319 | 0.0238 | 0.0177 | 0.0132 | 0.0099 |
| 34 | 0.3660 | 0.2636 | 0.1904 | 0.1379 | 0.1002 | 0.0730 | 0.0534 | 0.0391 | 0.0288 | 0.0212 | 0.0157 | 0.0116 | 0.0086 |
| 35 | 0.3554 | 0.2534 | 0.1813 | 0.1301 | 0.0937 | 0.0676 | 0.0490 | 0.0356 | 0.0259 | 0.0189 | 0.0139 | 0.0102 | 0.0075 |
| 36 | 0.3450 | 0.2437 | 0.1727 | 0.1227 | 0.0875 | 0.0626 | 0.0449 | 0.0323 | 0.0234 | 0.0169 | 0.0123 | 0.0089 | 0.0065 |
| 37 | 0.3350 | 0.2343 | 0.1644 | 0.1158 | 0.0818 | 0.0580 | 0.0412 | 0.0294 | 0.0210 | 0.0151 | 0.0109 | 0.0078 | 0.0057 |
| 38 | 0.3252 | 0.2253 | 0.1566 | 0.1092 | 0.0765 | 0.0537 | 0.0378 | 0.0267 | 0.0190 | 0.0135 | 0.0096 | 0.0069 | 0.0049 |
| 39 | 0.3158 | 0.2166 | 0.1491 | 0.1031 | 0.0715 | 0.0497 | 0.0347 | 0.0243 | 0.0171 | 0.0120 | 0.0085 | 0.0060 | 0.0043 |
| 40 | 0.3066 | 0.2083 | 0.1420 | 0.0972 | 0.0668 | 0.0460 | 0.0318 | 0.0221 | 0.0154 | 0.0107 | 0.0075 | 0.0053 | 0.0037 |

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