**Paper 9 - Operations Management & Information Systems**

**Time allowed-3hrs** **Full Marks: 100**

**Section –A (60 Marks)**
**(Operations Management)**
**Answer Question No. 1 (carrying 12 marks) which is compulsory and answer any four (carrying 12 marks each) from the rest in this Section.**

**Working Notes should form part of the answer.**

**1.**

**a)** A firm operates 6 days a week on single shift of 8 hours per day basis. There are 10 machines of the same capacity in the firm. If the machines are utilized for 75 percent of the time at a system efficiency of 80 percent, what is the rated output in terms of standard hours per week? [2]

**b)** A worker works for 8 hours in each shift, but during that time he had clocked for 7 hours on the job. Calculate his utilization. [2]

**c)** Solve the game with the following pay- off matrix. [2]

| | | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
|---|---|---|---|---|---|
| Player A | $A_1$ | 1 | 7 | 3 | 4 |
| | $A_2$ | 5 | 6 | 4 | 5 |
| | $A_3$ | 7 | 2 | 0 | 3 |

**d)** Name five general purpose machines. [2]
**e)** List the Uses of Jigs and Fixtures. [4]

**2.**

**(a)** Workers come to tool store room to enquire about special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds.

Determine:
(i) average queue length,
(ii) average length of non-empty queues,
(iii) average number of workers in system including the worker being attended,
(iv) mean waiting time of an arrival,
(v) average waiting time of an arrival who waits. [6]

**(b)** Write down the eight steps of Benchmarking Process. [4]
**(c)** Write down the objectives of Scheduling. [2]

**3.**

**a)** A Mutual Fund has cash resources of ₹ 200 million for investment in a diversified portfolio. Table below shows the opportunities available, their estimated annual yields, risk factor and term period details.
Formulate a Linear Program Model to find the optimal portfolio that will maximize return, considering the following the following policy guidelines:

- All the funds available may be invested
- Weighted average period of at least five years as planning horizon.
- Weighted average risk factor not to exceed 0.20.
- Investment in real estate and speculative stocks to be not more than 25% of the monies invested in total.

| Investment type | Annual yield (percentage) | Risk factor | Term period (years) |
|---|---|---|---|
| Bank deposit | 9.5 | 0.02 | 6 |
| Treasury notes | 8.5 | 0.01 | 4 |
| Corporate deposit | 12.0 | 0.08 | 3 |
| Blue-chip stock | 15.0 | 0.25 | 5 |
| Speculative stocks | 32.5 | 0.45 | 3 |
| Real estate | 35.0 | 0.40 | 10 |

[6]

**b)** State the characteristics of just-in-time System. [4]

**c)** What are the difference between CPM and PERT. [2]

**4.**

**a)** Write down a short note on Mean Absolute Deviation (MAD) and Bias. [3+3=6]

**b)** Southern Naval Command of Indian Navy has 10 ships which arrive at Cochin Naval Base for repairs and other maintenance work with a negative exponential distribution of the inter-arrival times. The mean of these times is 15 days. The time for which a ship occupies a berth for repair-and-maintenance shows a negative exponential distribution with a mean of 25 days. If the average delay in the repair/maintenance of ships is to be kept below five days, how many berths should there be at the naval base? [6]

**5.** A firm works 40 hours a week and has a capacity of overtime work to the extent of 20 hours in a week. It has received seven orders to be processed on three machines N, P, and C, in the order N, P, C & to be delivered in a week's time from now. The process times (in hours) are recorded in the given table:-

| Job | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Machine N | 7 | 8 | 6 | 6 | 7 | 8 | 5 |
| Machine P | 2 | 2 | 1 | 3 | 3 | 2 | 4 |
| Machine C | 6 | 5 | 4 | 4 | 2 | 1 | 5 |

The manager, who, in fairness, insists on performing the jobs in the sequence in which they are received, is refusing to accept an eighth order, which requires 7, 2, and 5 hours respectively on N, P and C machines, because, according to him, the eight jobs would require a total of 61 hours for processing, which exceeds the firm's capacity. Advise him.

Using the condition: If minimum processing time in column 1> max processing time of column 2.

Or

If minimum processing time in column 3 > maximum processing time of column 2.

Then, new column 1 = column 1+ column 2

new column 2 = column 2 + column 3 [12]

**6.**

**a)** List the factors which affecting process planning. [4]

**b)** Find the machining cost of a M.S. Bar on a lathe from the following data :
R.P.M. of the job = 500
Feed of tool per revolution of job = 0.75 mm
Depth of cut = 2.4 mm
Diameter of raw material = 90 mm
Diameter of finished job = 60 mm
Length of job = 1500 mm
Machining cost = ₹ 4.5 per hour. [4]

**c)** Product A has a Mean Time between Failures (MTBF) of 30 hours and has a Mean Time To Repairs (MTTR) of 5 hours. Product B has a MTBF of 40 hours and has a MTTR of 2 hours.

i) Which product has the higher reliability?
ii) Which product has greater maintainability?
iii) Which product has greater availability? [1+1+2=4]

**Section B (40 Marks)**
**Information System**
**Answer Question No. 7 (carrying 8 marks) which is compulsory and answer any four (carrying 8 marks each) from the rest in this Section.**

**7.**

**a)** Whether a Website is a product or a service? [2]
**b)** Write two negative effect of coding. [2]
**c)** What is the limitation of using flowcharts? [2]
**d)** What are the major attributes of judging a CPU? [2]

**8.**

**a)** Write down the major areas of computer-Based applications. [5]
**b)** What steps should be taken for successful installation of an equipment? [3]

**9.**

**a)** State the benefit of Business Intelligence (BI). [4]
**b)** What is communication protocol? What are its functions? [4]

**10.**

**a)** What are the features of Inventory Management in SAP? [5]
**b)** What is meant by "backup" of computer files? Why is it necessary to keep back up of computer file? [3]

**11.**

**a)** What is Program Debugging? Mention the steps involved therein. [4]
**b)** Discuss the characteristics of a good coding system. [4]

**12.**

**a)** Write a short note on DBMS [Data Base Management System]. [2]
**b)** What is Business Process Re- engineering (BPR). [2]
**c)** How does EDI work? Write about the uses of EDI. [4]