RD-0786
M. Com. (Sem. IV) Examination
March / April - 2017
Advanced Statistics : Paper - XII

Time : 2 Hours] [Total Marks : 50

(1) Name of the Examination : M. COM. (SEM. 4)
Name of the Subject : ADVANCED STATISTICS : PAPER - 12
Subject Code No. : 0786

(2) जबक्षणां अंक प्रश्नां पूरा गूढ़ सुनवा घरे.
(3) अकष पेपरं अपे सार्वजनिक क्रेडिट विन्यंती करावणी आवश्यकां आवश्यक.
(4) साधा क्रेडिटप्याचे उपयोग करी शकावे.

1 नीव्हेतां प्रश्नां जवाब आयोज : 10

(1) सुरुवात आयोजन समस्यांचा उद्लेख माटे सुमारे विभागित पाठत चाहती केरी रॅट जुदूंपर्यंत पर्यंत ?

(2) नीव्हेतां सुरुवात आयोजन प्रमुख संबंधी हुजूम प्रश्न वाढते :
प्रत्येक : $x_1 + 2x_2 \geq 2$, $x_1 + 3x_2 \geq 1$, $2x_1 + 4x_2 \geq 3$

$\begin{align*}
x_1 & \geq 0, \\
x_2 & \text{ जिन प्रत्येक्षितपणे} \\
\text{आपित रक्षित : } Z_x & = 5x_1 + 12x_2 \text{ ने अनुप्रस्ताव अनुभवे.} \\
\end{align*}$

(3) कालेन समाय (M/M/I) : $(\infty/FCFS)$ माटे काळेन अवस्थांची आपित अंतर्भावी अधिकतात संपूर्ण शोधी.
(4) क्रेडेंटियल भागमाला ््यस्तों उपयोगितावाली समस्यांही जाधीवी.
(5) क्रेडेंटियल विषयमात अत्यन्त अधिक अनेक स्थानावरी सर्टावाशी करो.

2 (a) सुऱ्येष आयोजनना प्राथमिक प्रश्न बनो अने जतावो के आ प्रश्नात ्थानात ्थान प्राथमिक प्रश्न धार ्. 6
(b) नीणीय सुऱ्येष आयोजन समस्याना ्थान प्रश्नात इलेक्ट्रॉनिक परखी मूल्य प्रश्नात इलेक्ट्रॉनिक मेंवाकवा.

अनुसरण

2 (a) सुऱ्येष आयोजनां ्थानात अथे समजवो तथा ्थानात भूलपूल प्रमेय ्थानातवी.
(b) ्एक विनायकी भे प्रारंभी पदांमधे A1 अने A2 बनेवाहीने वेचे ्. ्टेरे A1 अने A2 पदांमधे मानायला माहे 2 दिवस जडली ्. ्आ पदांमधे मानायला माहे 100 दिवस उपवालय ्. पदांमधे A1 माहे ्टेरे वितर अने वेचे A2 माहे वितर करून जडली ्. ्आ पदांमधे माहे पडांमधे पडाका वितर 80 दिवस करून वापरी साधण तेने ्. ्ो दीर्घ पदांमधे A1 अने A2 पर ्टाळकारे २. १००० अने २. १६०० नको मानातो होय तो मृत्तम नको मेंवाला माहे ्टेरे प्रारंभी पदांमधे A1 केवल अेकम नांद नको मेंवाला होईले ्? ्आ प्रश्नात इलेक्ट्रॉनिक विषयमाती माहे मेंवाला तथा तेना परखी तेनात ्थान प्रश्नात इलेक्ट्रॉनिक उदेख शोधी.

3 (a) क्रेडेंटियल भ्रम प्रथात आयोजकी सर्ेसाठ संभा मेंवाला तथा क्रेडेंटियल K आयीवा K शिप धारये तेनी संभा मेंवाला मेंवाला तथा क्रेडेंटियल विषयमात आयोजण T संभा करता वराहण संभा व्यतीत तात तेनी संभा मेंवाला शोधी.
(b) The question asks two separate parts:

**(a)** Suppose there are two processes in a computer system, each with a CPU time of 20 units. The first process is released at time 0, and the second process is released at time 5. Determine the time at which the second process finishes.

**(b)** The question states that a company has two machines, each with a processing time of 10 units. The first machine is ready at time 0, and the second machine is ready at time 5. Calculate the time at which the second machine finishes.

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3 (a) The question relates to the operation of a computer system with two processes. It asks to determine the time at which the second process finishes. The solution involves calculating the time difference between the release times of the two processes.

3 (b) The question pertains to a manufacturing system with two machines. It requests the time at which the second machine finishes. The solution involves calculating the time difference between the availability times of the two machines.

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4 (a) The question involves a computer system with two processes, each with a CPU time of 20 units. It asks to determine the time at which the second process finishes. The solution involves calculating the completion time of the second process.

4 (b) The question is about a manufacturing system with two machines, each with a processing time of 10 units. It requests the time at which the second machine finishes. The solution involves calculating the completion time of the second machine.

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4 (a) The question asks to determine the time at which the second process finishes. The solution involves calculating the completion time of the second process.

(b) The question involves a manufacturing system with two machines, each with a processing time of 10 units. It requests the time at which the second machine finishes. The solution involves calculating the completion time of the second machine.
(1) ट्रकने बोझिल (भरवा) करवा माटे राह जेही पडे तेनी संभावना शोधो।

(2) ट्रक गोलांन पर व्यतित कर्यो पठतो समय शोधो।
(3) दिवस दरमिशं दर्योगांच्या क्रॅन्कटर्नी ट्रकने सर्वेशष प्रतिभा समय शोधो।

ENGLISH VERSION

Instructions : (1) As per the instruction no. 1 of page no. 1.
            (2) Figures to the right indicate full marks of the questions.
            (3) Graph papers and statistical tables would be supplied on request.
            (4) Simple calculator can be used.

1 Answer the following questions:

(1) How the revised simplex method for the solution of linear programming problem differs from the simple method?

(2) Write a dual problem of the following linear programming problem.  
Minimize, \( Z_c = 5x_1 + 12x_2 \).
Subject to the conditions
\( x_1 + 2x_2 \geq 2, \ x_1 + 3x_2 \geq 1, \ 2x_1 + 4x_2 \geq 3 \)
\( x_1 \geq 0, \ x_2 \) unrestricted

(3) For the queueing model (M/M/I) : (\( \infty \)/FCFS). Find the expected number of customers in the queueing system.

(4) State the problems in the practical utility of queueing models.

(5) Explain the difference between transient and steady status in the queueing theory.
2 (a) State the primal linear programming problem and show that the dual of this dual problem is primal problem.

(b) From the optimum solution of the dual problem of the following linear programming problem, obtain the optimum solution of the basic problem.
Minimize \( Z_x = 500 \, x_1 + 70 \, x_2 + 125 \, x_3 \), subject to the conditions.
\[-5x_1 - x_2 \leq -20, \quad 3x_1 + x_3 \geq 15, \quad x_1, \, x_2, \, x_3 \geq 0\]

OR

2 (a) Explain the meaning of duality in the linear programming. Also explain the fundamental duality theorem.

(b) A company produces and sales two types of commodities \( A_1 \) and \( A_2 \). 2 days are required to produce the commodity \( A_1 \) and \( A_2 \) each. 100 days are available to produce these commodities. For the commodity \( A_1 \), one litre colour and for the commodity \( A_2 \), two litres colour is required. At the most 80 litres of the colour can be used for these commodities. If on each commodity of \( A_1 \) and \( A_2 \), the profit of Rs. 1000 and Rs. 1600 is gained, respectively. Then how many units of each type of commodities should be produced to maximize the profit. Obtain the optimum solution of this problem, by simplex method and from that, also find the optimum solution of its dual problem.

3 (a) Obtain the expected number of customers waiting in the queue. Also find the probability for the size of queue \( K \) or more than \( K \). Also obtain the probability of passing the time, more than \( T \) in the queueing system.
(b) Obtain the optimum solution of the dual problem from the optimum solution of the following linear programming problem.
Maximize $Z = 50x_1 + 70x_2$, subject to the conditions,
$\begin{align*}
  x_1 + x_2 &\leq 70, \\
  -x_1 &\geq 100, \\
  2x_1 + x_2 &\leq 120 \\
  x_1 &\geq 0, \\
  x_2 &\geq 0
\end{align*}$

OR

3 (a) Explain how the solution of a linear programming problem can be obtained by the revised simplex method?
(b) Explain the queueing model (M/M/1) : ($\infty$/FIFO). Also, discuss the various results of it.

4 (a) Though the queueing problem is important, explain its limitations.
(b) A rural branch of a nationalized bank has only one cash counter. It is assumed that the customer arrival at the bank follows a Poisson distribution with mean of 20 persons per hour. While service is exponentially distributed with mean of 30 persons per hour. Then obtain the answers of the following questions:

(1) Find the expected number of customers in the queueing system.
(2) Obtain the average number of customers in a queue.
(3) Find the expected waiting time of customer in a queue.
(4) Find the average waiting time of a customer for service in the queueing system.

OR

4 (a) Discuss the exponential distribution in the study of queueing theory.
(b) A cement producing factory distributes cement from its only godown, by trucks of Co and by the trucks of contractors. On average at every 5 minutes one truck arrives at godown, and the average loading time is 3 minutes. 40% trucks belongs to contractor. The arrival of truck follows Poisson distribution and the loading time follows exponential distribution. Then answer the following questions:

(1) Find the probability that a truck has to wait for loading.

(2) Obtain the waiting time of a truck at godown.

(3) Find the expected waiting time for the trucks of a contractor in a queue per day.