

QS026/2
Mathematics
Paper 2
Semester II
Session 2004/2005
2 hours

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Matematik
Kertas 2
Semester II
Sesi 2004/2005
2 jam



BAHAGIAN MATRIKULASI
KEMENTERIAN PELAJARAN MALAYSIA
MATRICULATION DIVISION
MINISTRY OF EDUCATION MALAYSIA

PEPERIKSAAN SEMESTER PROGRAM MATRIKULASI
MATRICULATION PROGRAMME EXAMINATION

MATEMATIK
Kertas 2
2 jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.
DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Kertas soalan ini mengandungi **11** halaman bercetak.
This booklet consists of 11 printed pages.

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INSTRUCTIONS TO CANDIDATE:

This question booklet consists of **10** questions.

Answer **all** questions.

The full marks for each question or section are shown in the bracket at the end of each of the question or section.

All steps must be shown clearly.

Only non-programmable scientific calculators can be used.

Numerical answers can be given in the form of π , e , surd, fractions or up to three significant figures, where appropriate, unless stated otherwise in the question.

1. (a) The following data set represents the number of candies that was obtained by 8 children in a game.

3 0 2 1 2 0 2 3

Determine the median. [2 marks]

- (b) The sample variance of a set of data with $n = 10$ is $\frac{209}{90}$. If $\sum_{i=1}^{10} x_i^2$ is 65, find the sample mean. [5 marks]

2. A gymnastic team consists of 5 men and 7 women.

- (a) In how many ways can the team be lined up if all the men have to be together? [2 marks]

- (b) Find the number of ways a team of 5 members can be formed if the team consists of

(i) 3 men and 2 women. [2 marks]

(ii) at least 3 men. [3 marks]

3. (a) How many words consisting of three alphabets can be formed from the word TSUNAMI if

(i) none of the alphabets can be repeated? [2 marks]

(ii) every alphabet can only be used once in each word and no word starts with M? [2 marks]

- (b) How many ways can two alphabets be chosen from the word TSUN and one alphabet from the word AMI? [2 marks]

4. Given that the two events E and F with $P(E) = 0.1$ and $P(F) = 0.3$ are independent.

(a) State a condition for the two events E and F to be independent. [1 mark]

(b) Find $P(E \cap F)$. Are the events E and F mutually exclusive? [3 marks]

(c) Find $P(E' | F')$. [3 marks]

5. The workers in a factory need to attend a competency course and pass three tests. The probability of passing the first test is 0.9 and if a worker passes a test, the probability that the worker will pass the subsequent test is 0.7. Instead, if the worker fails, the probability that the worker will fail the subsequent test is 0.8.

- (a) Construct a tree diagram for the events. [3 marks]
- (b) Find the probability that a worker will pass the first and the third test. [3 marks]
- (c) Find the probability that a worker will pass at least two tests. [3 marks]

6. The probability density function of a continuous random variable X is given by

$$f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 \leq x < k \\ 0, & \text{otherwise} \end{cases}$$

where k is a positive constant.

- (a) Show that $k = 2$. [4 marks]
- (b) Calculate $P(0.5 \leq X \leq 3)$. [3 marks]
- (c) Find the mean and variance of X . [6 marks]

7. A discrete random variable X has a probability distribution function given by

$$P(X = x) = m \left| \frac{3}{2} - x \right|, x = 0, 1, 2, 3, 4, 5$$

where m is a constant.

- (a) Determine the value of m . [2 marks]
- (b) Calculate $P(X = x)$, $x = 0, 1, 2, 3, 4, 5$. [2 marks]
- (c) Find the mean and variance for $Y = 5 - 2X$. [8 marks]

8. The following table shows the distribution for the weight of 50 parcels in a post office.

Weight (kg)	Number of Parcels
0.5 – 5.5	4
5.5 – 10.5	6
10.5 – 15.5	12
15.5 – 20.5	16
20.5 – 25.5	10
25.5 – 30.5	2

- (a) Calculate the mean and the first quartile of the above sample. [5 marks]
- (b) Construct a cumulative frequency table “less than” and subsequently draw an ogive “less than” on a graph paper. [3 marks]
- (c) Based on the graph, answer the following questions.
- (i) It is found that 25% of the parcels exceed the maximum allowable weight. Approximate the allowable maximum weight. [2 marks]
- (ii) Approximate the percentage of parcels whose weight exceeds 23 kg. [2 marks]
9. The distribution of the number of car breakdowns on a highway in any one day is Poisson with mean 3.5.
- (a) Find the probability that
- (i) exactly 2 cars break down on a particular day. [2 marks]
- (ii) at most 5 cars break down on a particular days. [2 marks]
- (iii) between 100 to 111 cars break down on the days for the month of April. [6 marks]
- (b) An auto repair company places 3 of its trucks to provide assistance in car breakdowns along the above highway everyday. Find the probability that on a particular day the company could not provide any such assistance. [2 marks]

10. It is known that 10% of the patients with high fever are confirmed to be suffering from dengue fever.
- (a) If 15 patients with high fever are randomly chosen, find the probability that
- (i) less than 6 are confirmed to be suffering from dengue fever. [3 marks]
 - (ii) exactly 10 patients with high fever are confirmed to be free of dengue fever. [3 marks]
- (b) If 100 patients with high fever are randomly chosen,
- (i) approximate the probability that 9 to 14 patients are confirmed to be suffering from dengue fever. [5 marks]
 - (ii) find the value of m such that the probability of more than m patients that are confirmed to be suffering from dengue fever is 0.025. [4 marks]

END OF QUESTION PAPER