QS026/2
Matematik
Kertas 2
Semester II
Sesi 2003/2004
2 jam
Mathematics
Paper 2
Semester II
Session 2003/2004
2 hours

BAHAGIAN MATRIKULASI
KEMENTERIAN PENDIDIKAN MALAYSIA
MATRICULATION DIVISION
MINISTRY OF EDUCATION MALAYSIA

PEPERIKSAAN SEMESTER PROGRAM MATRIKULASI
SEMESTER EXAMINATION FOR MATRICULATION PROGRAMME
SEMESTER II
SESI 2003/2004
SEMESTER II
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MATEMATIK
Kertas 2
2 jam
MATHEMATICS
Paper 2
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JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.
DO NOT OPEN THIS QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

CHOW CHOON WOOI

Kertas soalan ini mengandungi **12** halaman bercetak.
This question booklet consists of **12** printed pages.

INSTRUCTIONS TO CANDIDATE :

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

Answer **all** the questions.

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

All steps must be clearly shown.

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 appropiate, unless stated otherwise in the question.

1. The number of accidents recorded yearly in a certain district for eight consecutive years are 96, 82, 80, x, 94, 82, 96, and $(x+6)$. If the sample mean is 88, find the value of x and the sample median. [5 marks]

2. Fifteen glasses of similar colour and size, are labeled each with a number from 1 to 15. In how many ways can

    (a) 8 glasses be selected such that 5 are labelled with odd numbers and the rest with even numbers? [4 marks]

    (b) 5 glasses be arranged in a row such that the first 3 glasses are labelled with odd numbers and the other two with even numbers? [3 marks]

3. (a) For any sets R and S, $P(R) = P(S' \cap R) + P(S \cap R)$. Show that $P(S \mid R) = 1 - P(S' \mid R)$. [2 marks]

    (b) If $P(R) = 0.5$, $P(S') = 0.3$ and $P(S' \mid R) = 0.4$, evaluate $P(R \cup S)$. [5 marks]

4. The average number of students entering the main door of a library between 9:00 to 9:30 am during the school holidays is 10.

    (a) Calculate the probability that 3 to 5 students will enter the library at that particular time. [3 marks]

    (b) If the probability of less than m students entering the library at that time is 0.583, find the value of m. [3 marks]

5. The probability distribution function of a random variable X is

$$P(X = x) = k\binom{3}{x} \quad \text{for } x = 0, 1, 2, 3$$

where k is a constant. Determine

(a) the value of k. Hence, find $P(0 < X < 3)$. [4 marks]

(b) $E(X)$, $\text{Var}(X)$ and $\text{Var}(2X - 3)$. [8 marks]

6. The monthly earnings of operators in a particular factory are normally distributed with mean RM780 and standard deviation RM8.

(a) If the factory has 900 operators, how many operators earn between RM770 to RM800 a month? [7 marks]

(b) If 67% of the operators earn more than RMd monthly, what is the value of d? [5 marks]

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

$$f(x) = \begin{cases} cx^2, & 0 < x < 3 \\ 0, & \text{others} \end{cases}$$

where c is a constant. Find

(a) the value of c and $P(1 < X < 2)$. [4 marks]

(b) the median of X. [3 marks]

(c) $E(X)$ and $\text{Var}(X)$. [5 marks]

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8. A total of 120 students of a private college ride 3 types of motorcycles (KRISS, SUZUKI and HONDA) to campus. From the total, 75 riders are males. Out of 50 students who ride KRISS, 30 are females. There are 30 males who ride SUZUKI and 5 females who ride HONDA. If one student who rides a motorcycle to campus is chosen at random, find the probability that the student

    (a) rides a KRISS or a SUZUKI.   [5 marks]

    (b) is female or rides a SUZUKI.   [2 marks]

    (c) rides a SUZUKI given that the student is female.   [2 marks]

    (d) is male who rides a SUZUKI or female who rides a KRISS.   [2 marks]

9. The probability that a person is cured from *pneumonia* after being given a new type of medicine is 0.4.

    (a) If a sample of 20 patients is randomly selected,
         (i)   find the mean and standard deviation of patients that will be cured.

                                                                      [3 marks]
         (ii) find the probability that 4 to 12 patients will be cured.   [4 marks]

    (b) If a sample of 100 patients is randomly selected, find the probability that less than 66 patients will not be cured.   [6 marks]

10.   The frequency distribution table for ages (in years) of a sample of 50 participants in a motivation program is as follows:

Age Class Limit	Number of Participants
7 – 9	4
10 – 12	10
13 – 15	12
16 – 18	18
19 – 21	6

(a)   Find the mean, median, mode and standard deviation of the above sample.

[10 marks]

(b)   Draw an ogive (less than) and subsequently, approximate the first and third quartiles, and the percentage of participants whose ages exceed 16 years old.

[5 marks]

END OF QUESTION PAPER