MATHEMATICS

SUBJECT 9187

PAPER 2

QUESTION 1

The question was well attempted by most of the candidates with the majority scoring all the marks.

Correct answers

(i) $\lambda = 325\ N$ *(ii)* $E.P.E. = 100J$

Errors arising from few candidates

(ii) Mixture of cm and metres on substituting into the formula for E.P.E.

QUESTION 2

Most of the candidates managed to formulate the two simultaneous equations $0{,}09^2 = W^2\,(a^2 - 0{,}02^2)$ but made errors on solving them simultaneously.

Correct answers

$W2 = 15$ $T = 2\backsimeq \sqrt{\frac{1}{5}}$ *(AG)*

Errors arising

Premature rounding off errors especially for candidates who determined the value of 'a' before w.

QUESTION 3

Most of the candidates showed a clear understanding of the concept required by the question with the majority scoring the maximum possible marks.

Correct answers: *(i)* $Uq = 5(e + 1)$ *A.G.* *(ii)* $Vp = 5\ (1\text{-}e)$

QUESTION 4

The first part of the question was well done by majority of the candidates but the majority failed to identify that for complete circles $T > 0$ $\theta = 180^\circ$.

Correct answers: (a) $T = 4\ U^2 + 12g\ Cos\ \theta - 8g$ *(b)* $U^2 > 5g$ *(AG)*

QUESTION 5

Most of the centres showed lack of understanding of the concepts required by the question. Candidates who attempted the question showed mixed concepts on resolution of forces and moments.

Correct answers: *(a) (i)* $N = \frac{2\sqrt{3}}{3} R\ (AG)$ *(ii)* $N\hat{A}B = \frac{x}{6} - \theta\ (AG)$

(b) $\cot\theta = 2\sqrt{3}\ (AG)$

QUESTION 6

Most of the candidates managed to obtain and solve the required simultaneous equations with a few failing to identify that $g = 10\ m/s^2$. Part (iii) was performed badly with the majority failing to identify the use of partial fractions before integrating.

Correct answers: (i) $v\frac{dv}{dx} = \frac{30-6v}{5}\ (AG)$

(ii) $T = \frac{5g}{2}\ (AG)$

(iii) $x = \frac{25}{6} In5 - \frac{9}{3}\ (AG)$

Common errors

$$\int \frac{V}{3g-6v}\, dv = -\frac{1}{6} In\,(3g-6v)$$

QUESTION 7

This question was badly done by most of the candidates with the majority not attempting part (ii) and (iv) of the question.

Correct answers: (i) $x \sin\theta = (za - n) \sin\Phi\ (AG)$

(ii) x > a (AG)

(iii) T (sin θ _ $\sin\Phi) = w^2 x \sin\theta\ (AG)$

(iv) T = $\frac{mw^2 x\,(za-x)}{2a}$

Common errors

For candidates who attempted part (ii) they failed to identify that

Cos $\theta = \frac{\sqrt{n^2-r^2}}{n}$ and $Cos\ \emptyset = \frac{\sqrt{(2a-n)2}}{2a-x}$

QUESTION 8

This question was well attempted by the majority of the candidates.

Correct answers:

0,01656

Common errors

Interpretation:

$P(X > 5) = 1 - [P_0 + P_1 + P_2 + P_3 + P_4]$

Instead of

$P(X > 5) = 1 - [P_0 + P_1 + P_2 + P_3 + P_4]$

QUESTION 9

Most of the candidates showed lack of knowledge of probability generating functions. The majority did not attempt the question.

Correct answers: $E(x) = \frac{1}{P}$

QUESTION 10

This question was well done by most of the candidates. The majority lost some marks on making a conclusion since they did not compare the actual figures of the X^2_{calc} *and* X^2_{crit}.

Correct answers: $X^2_{calc} = 0.21$ $X^2_{crit} = 18,47$
60,24 > 18,47, reject H_0 *and conclude that the type of house vary with location*

Common errors

$X^2_{calc} > X^2_{crit}$. *(To use actual value)*

QUESTION 11

The question was well attempted by the majority of candidates with a few failing to identify that the suitable test was a *t-test* instead of a *z-test*.

Correct answers: $\bar{x} = 0,024$ $r = 0,0782$ ($r^2 = 0,00636$)
$T_{crit} = 2,262$ $t_{cal} = 0,95$
$0,95 < 2,262$ *Accept T* H_0

Common errors

Use of biased estimate of $n2 = \frac{1}{10}\left(0{,}063 - \frac{0{,}24^2}{10}\right)$

Comparison of non-figures $T_{crit} < t_{cal}$

QUESTION 12

The question was well answered by the majority of the candidates, scoring the maximum marks.

Correct answers:

(a) $X \sim N(500; 160)$; $P(X > 514) = 0{,}1343$

(b) $X \sim N(550; 176)$; $P(X > 514) = 0{,}0034$

(c) $X \sim N(500; 237)$; $P(X > 514) = 0{,}1818$

QUESTION 13

Most candidates showed some good understanding of the $X^2 - test.$

Correct answers:

(a) $\lambda = 1{,}2\, f_e = 99; 72; 29; 9; 2; 0$
(b) $X^2_{calc} = 0.482$ $X^2_{crit} = 7{,}815$ *Accept* H_0

Common errors

Non pulling of expected frequencies less than 5.
Non comparison of actual figures $X^2_{calc} < X^2_{crit}$.

QUESTION 14

Most candidates who attempted the question answered it correctly.

Correct answers

(i) Inp = Ina + xInb

(ii) $\beta = 0{,}238$ $\alpha = -13{,}86$

(iii) Inp = -6,21558; P = 0,001998
E(X) = 10