

**CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC)  
NORTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZ-JES)**



**FORM SIX PRE – NATIONAL EXAMINATION 2026**

**141**

**BASIC APPLIED MATHEMATICS**

**Time: 3:00 Hours**

**Wednesday, 25<sup>th</sup> February 2026 a.m**

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**Instructions:**

1. This paper consists of ten **(10)** questions each carrying **ten (10)** marks.
2. Answer **all** questions.
3. NECTA Mathematical tables and non – programmable calculators may be used.
4. The work done in each question should be **shown clearly** in the answer booklet (s) provided
5. **All** writing should be in **blue** or **black** ink, **except** for drawings which must be in pencil.
6. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
7. Write your **Examination number** on every page of your answer booklet(s).

1. Use non-programmable calculator to evaluate

(a)  $\frac{e^{3! \div \log_4 3}}{\tan^{-1}(3.42) \times (\ln \sqrt{3})^{\frac{1}{2}}}$  correct to three significant figures

(b)  $y$  if  $s = \frac{1}{y\sqrt{2p}} e^{-\frac{(x-m)^2}{2s^2}}$  when  $s = 3.08$ ,  $x = 2$ ,  $p = 3.51$  and  $m = 1$  to four decimal places

(c)  $\frac{3-2\cos\theta}{9-4\sqrt{\sec^2\theta-1}}$  Given that  $\cos\theta = \frac{12}{13}$  where  $\theta$  lies in the first quadrant correct to three significant figures

(d)  $\frac{10p_5 \times \ln(0.007)}{\sqrt[3]{25}} \times \begin{vmatrix} 1 & 2 & 3 \\ 0 & 1 & 3 \\ 2 & -1 & 5 \end{vmatrix}$  correct to two decimal places

2. (a) If  $f(x)$  denotes an expression of quadratic expression then  $f(2) = 10$ ,  $f(-1) = -5$  and  $f(2.5) = 16$ . Find the expression

(b) A function is defined by  $2f(x) = 6 + \frac{2}{x+2}$ ,  $x \neq -2$

(i) Without changing the form, deduce the horizontal and vertical asymptote

(ii) Express the given rational function in another corresponding form

(iii) Sketch its graph

3. (a) From the given simultaneous equations, solve for  $X$  and  $Y$  in terms of  $a$  and  $b$  in

simplified form  $\begin{cases} x + y = 2a \\ ax + by = a^2 + b^2 \end{cases}$

(b) The roots of  $3x^2 + 4x - 5 = 0$  are  $\alpha$  and  $\beta$ , without solving the equation find the value of

(i)  $\frac{1}{\alpha} + \frac{1}{\beta}$

(ii)  $\alpha^2 + \beta^2$

(c) Find the sum of terms of the following series  $81 + 27 + 9 \dots \dots + \frac{1}{27}$

4. (a) If  $x = a\sin 2t$  and  $y = b\cos 2t$  evaluate  $\frac{dy}{dx}$  at  $t = \frac{3\pi}{8}$  in its simplest form

(b) Determine  $\frac{dy}{dx}$  if

(i)  $y^3 + x^4 + \cos y^4 = 0$

(ii)  $y = e^{x^2} \sin x$

(c) Find the coordinate of any stationary points on the curve  $y = 5x^6 - 12x^5$  and distinguish between them.

5. (a) (i) Find the value of  $n$  such that  $\int_1^2 nx(2+x^2)^3 dx = 1$

(ii) Evaluate  $\int_{\pi/6}^{\pi/3} \cos^2 x dx$

(b) Sketch and calculate the area of the segment of the curve  $y = x^2$  cut off by the line  $y = x$

(c) Find the volume obtained when the area bounded between  $y = x^{\frac{1}{3}}$ ,  $x=8$ ,  $x=27$  is rotated about the  $y$ -axis (leave  $\pi$  in your answer)

6. (a) The mean and variance of 7 observations are 8 and 16 respectively. If five of the observations are 2, 4, 10, 12 and 14 find the remaining two observations.

(b) Compute the mean and standard deviation to two decimal places of the following distribution by using coding method taking  $A = 44.5$

Age	20 -29	30-39	40-49	50-59	60-69
Cum-freq	11	36	50	57	60

7. (a) Find the value of  $n$  that will satisfy the following equation  ${}^nP_4 = 30 {}^nC_5$

(b) If the probability of drawing an ace is  $\frac{4}{52}$  the probability of drawing a spade is  $\frac{13}{52}$ . find the probability of drawing either ace or a spade in 52 packs of cards.

(c) A box contains 100 paper clips. 27 of the clips are too large and 16 of them are too small for the intended work. A paper clip is taken, judged and not replaced. A second clip is then treated similarly. Calculate the probability that:

- (i) Both paper clips are accepted for intended work
- (ii) The first paper clip is too large and the second is too small
- (iii) One paper clip is too large and the other is too small

8. (a) Eliminate  $\theta$  from the following parametric equation

$$x = \cos\theta + \sin\theta \text{ and } y = \cos\theta - \sin\theta$$

(b) If  $A + B = C$  and  $\tan A = P \tan B$  express  $\sin \frac{(A-B)}{\sin C}$  in terms of  $P$

(c) Solve the equation  $\sin x \cos x = \sqrt{3} \sin^2 x$  where  $0^\circ \leq x \leq 360^\circ$

9. (a) Find  $\frac{dy}{dx}$  of the following functions (i)  $y = e^{\sin x}$  (ii)  $y = \ln\left(\frac{3x-2}{x+1}\right)$

(b) (i) Evaluate  $\int \frac{1}{x \ln x} dx$

(ii) Solve for  $x$  if  $\log x^2 = (\log x)^2$

(c) If you deposit \$4000 into an account paying 6% annual interest compounded quarterly how much money will be in the account after 5 years?

10. (a) (i) Find  $x$  and  $y$  if  $x + y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$  and  $x - y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

(ii) Find the value of  $y$  for which the matrix  $A$  is singular if  $A = \begin{bmatrix} -2 & 1 & 1 \\ 3 & 2 & 2 \\ 1 & y & 4 \end{bmatrix}$

(b) A small brewery produces Spirit and Beer, suppose that the production is limited by scarce resources of corn, hops and barley malt. To make Spirit 5kg of corn, 4kg of hops and 35kg of malt are required. To make Beer 15kg of corn, 4kg of hops and 20kg of malt are required. Suppose that only 480kg of corn, 160kg of hops and 1190 kg of malt are available. If the brewery makes a profit of \$13 for each spirit and \$23 for each beer, use the knowledge of Linear Programming to advice the brewery owner