



UNIVERSITY OF GHANA

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DEPARTMENT OF TEACHER EDUCATION

SCHOOL OF EDUCATION AND LEADERSHIP

COLLEGES OF EDUCATION

END OF SEMESTER TWO EXAMINATIONS FOR LEVEL 400, 2023/2024
B.ED. PROGRAMME

COURSE CODE: TEJS 444

COURSE TITLE: Learning, Teaching and Applying Analytical Geometry

Instruction: Answer all questions in Section A and any three questions in Section B.
Time: 2 hours

SECTION A

[25 Marks]

Answer all the questions in this section.

1. Which quadrant on the cartesian plane contains the point (-6, 2)

- A. Quadrant I
- B. Quadrant II
- C. Quadrant III
- D. Quadrant IV

2. A line that touches the circle at exactly one point is called

- A. Secant
- B. Radius
- C. Tangent
- D. Chord

3. Which conic section is formed when a plane cuts parallel to the base of a cone?

- A. Parabola
- B. Circle
- C. Hyperbola
- D. Ellipse

4. Find the equation of the axis of the parabola $x^2 = 24y$.
- A. $x = 0$
 - B. $x = 6$
 - C. $y = 6$
 - D. $y = 0$
5. Find the length of the latus rectum of the parabola $y^2 = 40x$.
- A. 4 units
 - B. 10 units
 - C. 40 units
 - D. 80 units
6. An ellipse has _____ Vertices and _____ foci.
- A. two, one
 - B. One, two
 - C. one, one
 - D. two, two
7. Find the coordinates of the foci of the ellipse $\left(\frac{x}{25}\right)^2 + \left(\frac{y}{16}\right)^2 = 1$.
- A. $(\pm 3, 0)$
 - B. $(\pm 4, 0)$
 - C. $(0, \pm 3)$
 - D. $(0, \pm 4)$
8. What is the eccentricity for $\left(\frac{x}{25}\right)^2 + \left(\frac{y}{16}\right)^2 = 1$?
- A. $\frac{2}{5}$
 - B. $\frac{3}{5}$
 - C. $\frac{5}{3}$
 - D. 15
9. If the length of the major axis is 10 and the minor axis is 8 and the major axis is along the x-axis, then find the length of the ellipse equation.
- A. $\left(\frac{x}{4}\right)^2 + \left(\frac{y}{5}\right)^2 = 1$
 - B. $\left(\frac{x}{5}\right)^2 + \left(\frac{y}{4}\right)^2 = 1$
 - C. $\left(\frac{x}{10}\right)^2 + \left(\frac{y}{8}\right)^2 = 1$
 - D. $\left(\frac{x}{8}\right)^2 + \left(\frac{y}{10}\right)^2 = 1$

10. If the foci of an ellipse are $(0, \pm 3)$ and the length of the semi-major axis is 5 units, then find the equation of ellipse.

- A. $\left(\frac{x}{4}\right)^2 + \left(\frac{y}{5}\right)^2 = 1$
- B. $\left(\frac{x}{5}\right)^2 + \left(\frac{y}{4}\right)^2 = 1$
- C. $\left(\frac{x}{10}\right)^2 + \left(\frac{y}{10}\right)^2 = 1$
- D. $\left(\frac{x}{8}\right)^2 + \left(\frac{y}{10}\right)^2 = 1$

11. Find the coordinates of the foci of the hyperbola $\left(\frac{x}{9}\right)^2 - \left(\frac{y}{16}\right)^2 = 1$.

- A. $(\pm 3, 0)$
- B. $(\pm 4, 0)$
- C. $(0, \pm 3)$
- D. $(0, \pm 4)$

12. What is the transverse axis length for hyperbola $\left(\frac{x}{9}\right)^2 - \left(\frac{y}{16}\right)^2 = 1$?

- A. 5 units
- B. 4 units
- C. 8 units
- D. 6 units

13. A hyperbola in which the length of the transverse and conjugate axis are equal is called _____ hyperbola.

- A. Isosceles
- B. Equilateral
- C. Bilateral
- D. right

14. Find the coordinates of the point which divides the line $A(4, -1)$ and $B(4, 3)$ internally in the ratio 3: 1.

- A. $(2, 4)$
- B. $(-2, 4)$
- C. $(4, 2)$
- D. $(-4, 2)$

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15. Find the coordinates of the midpoint of the line segment joining the point $(-2, -5)$ and $B(3, -1)$.

- A. $\left(\frac{1}{2}, \frac{1}{3}\right)$
- B. $\left(\frac{1}{2}, -\frac{1}{3}\right)$
- C. $\left(2, -\frac{1}{3}\right)$
- D. $\left(\frac{1}{2}, -3\right)$

16. If a point $P(k, 7)$ divides the line segment joining $C(8, 9)$ and $D(1, 2)$ in a ratio $m:n$, then find the values of m and n .

- A. 2:5
- B. 5:2
- C. -2:5
- D. -5:2

17. Find the equation of the straight line with gradient 2 and pass through the point $P(0, 5)$.

- A. $y = 2x - 5$
- B. $y = 2x + 5$
- C. $y = -2x - 5$
- D. $y = -2x + 5$

18. $M(-2, 1)$ and $N(-6, 2)$ are points in plane. Find $|MN|$

- A. $\sqrt{15}$
- B. $\sqrt{16}$
- C. $\sqrt{17}$
- D. $\sqrt{18}$

19. The equation of a circle is $x^2 + y^2 - 4x + 6y - 12 = 0$. Find its radius.

- A. $2\sqrt{3}$
- B. 5
- C. 8
- D. 25

20. The equation of a circle is $3x^2 + 3y^2 + 6x + 9y - 3 = 0$. Find the coordinates of the centre.

- A. $\left(-2, \frac{3}{2}\right)$
- B. $\left(-1, -\frac{3}{2}\right)$
- C. $\left(1, -\frac{3}{2}\right)$
- D. $(2, -3)$

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21. An equation of a circle of radius $\sqrt{7}$ with the centre at the origin is
A. $x^2 - y^2 = \sqrt{7}$
B. $x^2 - y^2 = 7$
C. $x^2 + y^2 = \sqrt{7}$
D. $x^2 + y^2 = 7$
22. Find the gradient of the line perpendicular to the line joining the points $(-4, 6)$ and $(3, -7)$.
A. -13
B. $-\frac{7}{13}$
C. $\frac{7}{13}$
D. 13
23. A straight line makes an angle of 120° with the positive direction of the x – axis. Find the gradient of the line.
A. $\sqrt{3}$
B. 0.5
C. $-\frac{\sqrt{3}}{2}$
D. $-\sqrt{3}$
24. Find the equation of a straight line which passes through the point $(10, 8)$ and has a gradient of $\frac{2}{3}$.
A. $2x - 3y + 14 = 0$
B. $x - 2y + 2 = 0$
C. $2x + 3y + 4 = 0$
D. $3x - 2y + 4 = 0$
25. Find the equation of the perpendicular bisector of the line joining point $A(3,3)$ and $B(5, -1)$.
A. $y - 2x + 1 = 0$
B. $2y - x + 2 = 0$
C. $2y + x - 1 = 0$
D. $y + 2x - 1 = 0$

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SECTION B

ANSWER ANY THREE QUESTIONS FROM THIS SECTION

- 1a. Explain the concept of a coordinate system and its significance in geometry and mathematics 5marks
- 1b. Given the equation $x^2 - 4x - 8y - 4 = 0$. Find; 20marks
- The Vertex
 - The coordinates of the focus
 - The equation of the directrix
 - Latus rectum
- 2a. Find the angle between the lines $2y - 4x - 10 = 0$ and $y = 12x - 1$ 5marks
- 2b. Find the directrix, eccentricity and focus of the ellipse given by $4x^2 + 9y^2 = 36$. 15marks
- 2c. Find the equation of the tangent at the point $P(-1,2)$ of the ellipse $(x + 1)^2 + 4(y - 1)^2 = 4$. 5marks
- 3a. Plot the polar coordinate $\left(2, \frac{3\pi}{4}\right)$. 5marks
- 3b. How can the concept of coordinates be applied to real-life problems? Provide two examples 10marks
- 3c. Convert the equations below to polar form:
 α) $x^2 + y^2 = 9$
 β) $y^2 = 4x$ 10marks
- 4a. What is the geometric significance of the discriminant in the general equation of a circle? Explain with an example 7marks
- 4b. i. Find the angle between the lines $2y - 4x - 10 = 0$ and $y = 12x - 1$. 18marks
 ii. Find the directrix, eccentricity and focus of the ellipse given by $4x^2 + 9y^2 = 36$.
- 5a. Find the equation of the tangent at the point $P(-1,2)$ of the ellipse $(x + 1)^2 + 4(y - 1)^2 = 4$. 5marks
- 5b. Determine the equation of the hyperbola whose eccentricity is $\frac{3}{2}$ and the foci are $F(-2,0)$ and $F(2,0)$. 10marks
- 5c. Explain the polar coordinate system and how it differs from the Cartesian coordinate system 10marks