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BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, MULTAN.

OBJECTIVE KEY FOR INTERMEDIATE 2nd ANNUAL EXAMINATION, 2024

(74)

Name of Subject: \_\_\_\_\_

Mathematics. Part-II

Group: I

| Q. Nos      | Paper Code | Correct Answer   | Paper Code | Correct Answer   | Paper Code | Correct Answer   | Paper Code | Correct Answer   |
|-------------|------------|------------------|------------|------------------|------------|------------------|------------|------------------|
|             | 4191       |                  | 4193       |                  | 4195       |                  | 4197       |                  |
| 1           | A          | 2 sec            | D          | Ellipse          | A          | I                | A          | I & iv           |
| 2           | D          | $x=0$            | A          | Same centres     | B          | $2\tan^{-1}x+C$  | B          | $-9\sin 3x$      |
| 3           | C          | $8e^{2x}$        | B          | b                | D          | $x=asine$        | D          | 10, 10           |
| 4           | A          | I & iv           | B          | j                | D          | iv               | C          | $\frac{\pi}{12}$ |
| 5           | B          | $-9\sin 3x$      | C          | $1-\cos^2 x$     | C          | $\sqrt{2}$       | A          | 1                |
| 6           | D          | 10, 10           | A          | 2 sec            | B          | 5                | B          | $2\tan^{-1}x+C$  |
| 7           | C          | $\frac{\pi}{12}$ | D          | $x=0$            | A          | (1, -2)          | D          | $x=asine$        |
| 8           | A          | 1                | C          | $8e^{2x}$        | B          | 7                | D          | iv               |
| 9           | B          | $2\tan^{-1}x+C$  | A          | I & iv           | D          | Ellipse          | C          | $\sqrt{2}$       |
| 10          | D          | $x=asine$        | B          | $-9\sin 3x$      | A          | Same centres     | B          | 5                |
| 11          | D          | iv               | D          | 10, 10           | B          | b                | A          | (1, -2)          |
| 12          | C          | $\sqrt{2}$       | C          | $\frac{\pi}{12}$ | B          | j                | B          | 7                |
| 13          | B          | 5                | A          | $1-\cos^2 x$     | C          | $1-\cos^2 x$     | D          | Ellipse          |
| 14          | A          | (1, -2)          | B          | $2\tan^{-1}x+C$  | A          | 2 sec            | A          | Same centres     |
| 15          | B          | 7                | D          | $x=asine$        | D          | $x=0$            | B          | b                |
| 16          | D          | Ellipse          | D          | iv               | C          | $8e^{2x}$        | B          | j                |
| 17          | A          | Same centres     | C          | $\sqrt{2}$       | A          | I & iv           | C          | $1-\cos^2 x$     |
| 18          | B          | b                | B          | 5                | B          | $-9\sin 3x$      | A          | 2 sec            |
| 19          | B          | j                | A          | (1, -2)          | D          | 10, 10           | D          | $x=0$            |
| 20          | C          | $1-\cos^2 x$     | B          | 7                | C          | $\frac{\pi}{12}$ | C          | $8e^{2x}$        |
| Cross Check | A B C D    |                  | A B C D    |                  | A B C D    |                  | A B C D    |                  |
| Total       | 5645       |                  | 5645       |                  | 5645       |                  | 5645       |                  |

سرٹیفکیٹ بابت تصحیح سوالیہ پرچہ امارکنگ Key

ہم نے مضمون Mathematics پرچہ II گرپ I انٹرمیڈیٹ دوسرا سالانہ امتحان 2024 کا سوالیہ پرچہ انشائیہ و معروضی (Subjective & Objective) کو بنظر عین چیک کر لیا ہے یہ پرچہ Syllabus کے عین مطابق Set کیا گیا ہے۔ اس سوالیہ پرچہ میں کسی قسم کی کوئی غلطی نہ ہے۔ ہم نے سوالیہ پرچہ کا اردو اور انگریزی Version بھی چیک کر لیا ہے۔ یہ Version آپس میں مطابقت رکھتے ہیں۔ نیز اس پرچہ کی معروضی (MCQs) Key کی بابت تصدیق کی جاتی ہے کہ اس میں بھی کسی قسم کی کوئی غلطی نہ ہے۔ مزید یہ کہ ہم نے Key بنانے سے متعلق دفتر کی جانب سے تیار کردہ ہدایات وصول کر کے ان کا بغور مطالعہ کر لیا ہے اور ان کی روشنی میں Key بنائی ہے۔ نیز سب ایگزامینرز کیلئے تفصیلی مارکنگ ہدایات / مارکنگ سکیم / Rubrics بھی تیار کر دی گئی ہیں۔

Prepared & Checked By: \_\_\_\_\_

Dated: 25-10-2024

| S.# | Name                    | Designation         | Institution                                    | Mobile No    | Signature |
|-----|-------------------------|---------------------|------------------------------------------------|--------------|-----------|
| 1   | Khurram Shahzad         | Assistant Professor | Govt. Graduate College Civil Lines             | 03216343022  |           |
| 2   | Dr. M. Shahzad Akhtar   | Assistant Professor | Emerson University Multan                      | 0302-3531423 |           |
| 3   | Muhammad Adnan Anwar    | Assistant Professor | Gork. W. I. I. Hassan Islamia Graduate College | 03047060879  |           |
| 4   | DR. M. Javed Azhar Khan | SSS                 | Govt. H/S School 138-10/R                      | 03226171679  |           |
| 5   | M. Arif                 | A.P                 | G.G. College of Science Multan                 | 0300-8682996 |           |

Re-Checked By \_\_\_\_\_ ہم نے درج بالا سوالیہ پرچہ (انشائیہ + معروضی) معروضی "Key" اور ہدایات کے حوالہ سے مکمل طور پر تہیہ کر لی ہے۔ کسی قسم کی کوئی غلطی نہ ہے۔

|   |               |     |                                                   |             |  |
|---|---------------|-----|---------------------------------------------------|-------------|--|
| 1 | Nighat Yamin  | A.P | Govt. Graduate College (W), Chungi no. 16, Multan | 03317039467 |  |
| 2 | Muhammad Arif | A.P | G.G. College Civil Lines                          | 0300733574  |  |

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**BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, MULTAN.**  
**OBJECTIVE KEY FOR INTERMEDIATE 2nd ANNUAL EXAMINATION, 2024**

Name of Subject: Mathematics 12<sup>th</sup> class Group: II

| Q. Nos      | Paper Code 4192 | Correct Answer                      | Paper Code 4194 | Correct Answer                      | Paper Code 4196 | Correct Answer                      | Paper Code 4198 | Correct Answer                      |
|-------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|
| 1           | D               | $e^x - e^{-x}$                      | A               | $\frac{1}{a} \ln(ax+b)+c$           | D               | $A \neq B$ but Same Sign            | C               | $\frac{u \times v}{\sqrt{u^2+v^2}}$ |
| 2           | C               | $\mathbb{R}$                        | B               | $\ln(\tan x)+c$                     | C               | $\frac{u \times v}{\sqrt{u^2+v^2}}$ | D               | $a \cdot b$                         |
| 3           | B               | $n$                                 | C               | $\frac{1}{2}$                       | D               | $a \cdot b$                         | A               | Norm                                |
| 4           | A               | 1                                   | D               | 1                                   | A               | Norm                                | D               | $e^x - e^{-x}$                      |
| 5           | B               | $e^{x+h}$                           | A               | 1                                   | D               | $e^x - e^{-x}$                      | C               | $\mathbb{R}$                        |
| 6           | C               | $\frac{1}{1-x^2}$                   | B               | $x=5$                               | C               | $\mathbb{R}$                        | B               | $n$                                 |
| 7           | D               | $f(x)+c$                            | A               | $2x-3 > 0$                          | B               | $n$                                 | A               | 1                                   |
| 8           | A               | $\frac{1}{a} \ln(ax+b)+c$           | A               | 5                                   | A               | 1                                   | B               | $e^{x+h}$                           |
| 9           | B               | $\ln(\tan x)+c$                     | C               | $x=2$                               | B               | $e^{x+h}$                           | C               | $\frac{1}{1-x^2}$                   |
| 10          | C               | $\frac{1}{2}$                       | D               | $A \neq B$ but Same Sign            | C               | $\frac{1}{1-x^2}$                   | D               | $f(x)+c$                            |
| 11          | D               | 1                                   | C               | $\frac{u \times v}{\sqrt{u^2+v^2}}$ | D               | $f(x)+c$                            | A               | $\frac{1}{a} \ln(ax+b)+c$           |
| 12          | A               | 1                                   | D               | $a \cdot b$                         | A               | $\frac{1}{a} \ln(ax+b)+c$           | B               | $\ln(\tan x)+c$                     |
| 13          | B               | $x=5$                               | A               | Norm                                | B               | $\ln(\tan x)+c$                     | C               | $\frac{1}{2}$                       |
| 14          | A               | $2x-3 > 0$                          | D               | $e^x - e^{-x}$                      | C               | $\frac{1}{2}$                       | D               | 1                                   |
| 15          | A               | 5                                   | C               | $\mathbb{R}$                        | D               | 1                                   | A               | 1                                   |
| 16          | C               | $x=2$                               | B               | $n$                                 | A               | 1                                   | B               | $x=5$                               |
| 17          | D               | $A \neq B$ but Same Sign            | A               | 1                                   | B               | $x=5$                               | A               | $2x-3 > 0$                          |
| 18          | C               | $\frac{u \times v}{\sqrt{u^2+v^2}}$ | B               | $e^{x+h}$                           | A               | $2x-3 > 0$                          | A               | 5                                   |
| 19          | D               | $a \cdot b$                         | C               | $\frac{1}{1-x^2}$                   | A               | 5                                   | C               | $x=2$                               |
| 20          | A               | Norm                                | D               | $f(x)+c$                            | C               | $x=2$                               | D               | $A \neq B$ but Same Sign            |
| Cross Check | A B C D         |                                     | A B C D         |                                     | A B C D         |                                     | A B C D         |                                     |
| Total       | 6455            |                                     | 6455            |                                     | 6455            |                                     | 6455            |                                     |

سرٹیفکیٹ بابت تصحیح سوالیہ پرچہ / مارکنگ Key

ہم نے مضمون Mathematics پرچہ II گروپ II انٹر میڈیٹ دوسرا سالانہ امتحان 2024 کا سوالیہ پرچہ انشائیہ و معروضی (Subjective & Objective) کو بنظر عمیق چیک کر لیا ہے یہ پرچہ Syllabus کے عین مطابق Set کیا گیا ہے۔ اس سوالیہ پرچہ میں کسی قسم کی کوئی غلطی نہ ہے۔ ہم نے سوالیہ پرچہ کا اردو اور انگریزی Version بھی چیک کر لیا ہے۔ یہ Version آپس میں مطابقت رکھتے ہیں۔ نیز اس پرچہ کی معروضی (MCQs) Key کی بابت تصدیق کی جاتی ہے کہ اس میں بھی کسی قسم کی کوئی غلطی نہ ہے۔ مزید یہ کہ ہم نے Key بنانے سے متعلق دفتر کی جانب سے تیار کردہ ہدایات وصول کر کے ان کا بغور مطالعہ کر لیا ہے اور ان کی روشنی میں Key بنائی ہے۔ نیز سب ایگزامینرز کیلئے تفصیلی مارکنگ ہدایات / مارکنگ سکیم / Rubrics بھی تیار کر دی گئی ہیں۔

Prepared & Checked By:

Dated: 25-10-2024

| S.# | Name                    | Designation         | Institution                                            | Mobile No    | Signature |
|-----|-------------------------|---------------------|--------------------------------------------------------|--------------|-----------|
| 1   | Khurram Shahzad         | Assistant Professor | Govt Graduate College Civil Lines Multan               | 03216343022  |           |
| 2   | Dr. M. Shahzad Akhtar   | Assistant Professor | Emerson University Multan                              | 0302-3531423 |           |
| 3   | Muhammad Adnan Anwar    | Assistant Professor | Govt. Wilayat Hussain Islamia Graduate College, Multan | 03047060319  |           |
| 4   | DR. M. Javed Azhar Khan | SSS                 | Govt. H/S School 138/10-R                              | 03226171679  |           |
| 5   | M. Anif                 | A.P.                | G.G. College of Science Multan                         | 0300-8682996 |           |

Re-Checked By: ہم نے درج بالا سوالیہ پرچہ (انشائیہ + معروضی) معروضی "Key" اور ہدایات کے حوالہ سے مکمل طور پر تلی کر لی ہے۔ کسی قسم کی کوئی غلطی نہ ہے۔

|   |                 |      |                                  |             |  |
|---|-----------------|------|----------------------------------|-------------|--|
| 1 | Nighat Yasmin   | A.P. | G.G. College (w), Chungi, Multan | 03317039467 |  |
| 2 | Hafiz M. IRSHAD | A.P. | G.G. College Civil Lines Multan  | 03007331824 |  |

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|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------|------------------------------|---------------------|
| Paper Code<br>Number: 4191   |                                                                                                                                                                                                                                                                                                              | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____               |                     |
| MATHEMATICS PAPER-II GROUP-I |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                              |                     |
| TIME ALLOWED: 30 Minutes     |                                                                                                                                                                                                                                                                                                              | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20            |                     |
| Q.No.1                       | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                            |                                     |                              |                     |
| S.#                          | QUESTIONS                                                                                                                                                                                                                                                                                                    | A                                                                          | B                                   | C                            | D                   |
| 1                            | A stone falls from the height according to the law $h(x)=40-10x^2$ . It will strike the ground after:                                                                                                                                                                                                        | 2sec                                                                       | 4sec                                | 8sec                         | 10sec               |
| 2                            | The function $f(x) = \frac{2+3x}{2x}$ is discontinuous at:                                                                                                                                                                                                                                                   | $x = \frac{-2}{3}$                                                         | $x = 1$                             | $x = -3$                     | $x = 0$             |
| 3                            | If $f(x) = e^{2x}$ , then $f'''(x) =$                                                                                                                                                                                                                                                                        | $e^{2x}$                                                                   | $6e^{2x}$                           | $8e^{2x}$                    | $8e^x$              |
| 4                            | The function $f(x) = \sin x$ is increasing in quadrants:                                                                                                                                                                                                                                                     | I & IV                                                                     | II & III                            | I & II                       | III & IV            |
| 5                            | If $y = \sin 3x$ , then $y_2$ is equal to:                                                                                                                                                                                                                                                                   | $3\cos 3x$                                                                 | $-9\sin 3x$                         | $9\cos 3x$                   | $9\sin 3x$          |
| 6                            | The numbers whose sum is 20 and product is maximum are:                                                                                                                                                                                                                                                      | 15, 5                                                                      | 13, 7                               | 12, 8                        | 10, 10              |
| 7                            | $\int_0^3 \frac{dx}{x^2+9} =$                                                                                                                                                                                                                                                                                | $\frac{\pi}{4}$                                                            | $\frac{\pi}{6}$                     | $\frac{\pi}{12}$             | $\frac{\pi}{2}$     |
| 8                            | The order of differential equation $4x^2 = \left(\frac{dy}{dx}\right)^2$ is:                                                                                                                                                                                                                                 | 1                                                                          | 2                                   | 3                            | 4                   |
| 9                            | $\int \frac{2}{1+x^2} dx =$                                                                                                                                                                                                                                                                                  | $2\tan x + c$                                                              | $2\tan^{-1} x + c$                  | $\frac{1}{2}\tan^{-1} x + c$ | $2\cot^{-1} x + c$  |
| 10                           | Suitable substitution for $\int \frac{dx}{\sqrt{a^2-x^2}}$ is:                                                                                                                                                                                                                                               | $x = a \sec \theta$                                                        | $x = a \operatorname{cosec} \theta$ | $x = \sin \theta$            | $x = a \sin \theta$ |
| 11                           | If $x > 0, y > 0$ , then the point $P(x, -y)$ lies in quadrant:                                                                                                                                                                                                                                              | I                                                                          | II                                  | III                          | IV                  |
| 12                           | Distance between the points ( 1, 2 ) and (2, 1 ) is:                                                                                                                                                                                                                                                         | 1                                                                          | 2                                   | $\sqrt{2}$                   | $\sqrt{5}$          |
| 13                           | Perpendicular distance of the line $4x - 3y - 25 = 0$ from the origin is:                                                                                                                                                                                                                                    | 0                                                                          | 5                                   | 25                           | $\frac{25}{7}$      |
| 14                           | The point which is not included in the solution region of $2x - 3y \leq 6$ is:                                                                                                                                                                                                                               | (1, -2)                                                                    | (6, 2)                              | (-2, 1)                      | (3, 2)              |
| 15                           | Radius of the circle $x^2 + y^2 - 6x + 10y - 15 = 0$ is:                                                                                                                                                                                                                                                     | 0                                                                          | 7                                   | $\sqrt{13}$                  | $2\sqrt{13}$        |
| 16                           | If eccentricity of a conic is less than 1, then it is called:                                                                                                                                                                                                                                                | Parabola                                                                   | Circle                              | Hyperbola                    | Ellipse             |
| 17                           | The circles $x^2 + y^2 = 8$ and $x^2 + y^2 = 16$ have:                                                                                                                                                                                                                                                       | Same centres                                                               | Same radius                         | Same tangents                | Same normals        |
| 18                           | Let $\vec{u} = a\hat{i} + b\hat{j} + c\hat{k}$ , then projection of $\vec{u}$ along $\hat{j}$ is:                                                                                                                                                                                                            | $a$                                                                        | $b$                                 | $c$                          | $\vec{u}$           |
| 19                           | If $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors, then $\hat{k} \times \hat{i} =$                                                                                                                                                                                                                        | $-\hat{j}$                                                                 | $\hat{j}$                           | 1                            | 0                   |
| 20                           | If $\alpha, \beta$ and $\gamma$ are direction angles, then $\cos^2 \alpha + \cos^2 \beta =$                                                                                                                                                                                                                  | 1                                                                          | $\cos^2 \gamma$                     | $1 - \cos^2 \gamma$          | $-\cos^2 \gamma$    |

|                              |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                               |                     |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------|-------------------------------|---------------------|
| Paper Code<br>Number: 4193   |                                                                                                                                                                                                                                                                                                              | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____                |                     |
| MATHEMATICS PAPER-II GROUP-I |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                               |                     |
| TIME ALLOWED: 30 Minutes     |                                                                                                                                                                                                                                                                                                              | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20             |                     |
| Q.No.1                       | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                            |                                     |                               |                     |
| S.#                          | QUESTIONS                                                                                                                                                                                                                                                                                                    | A                                                                          | B                                   | C                             | D                   |
| 1                            | If eccentricity of a conic is less than 1, then it is called:                                                                                                                                                                                                                                                | Parabola                                                                   | Circle                              | Hyperbola                     | Ellipse             |
| 2                            | The circles $x^2 + y^2 = 8$ and $x^2 + y^2 = 16$ have:                                                                                                                                                                                                                                                       | Same centres                                                               | Same radius                         | Same tangents                 | Same normals        |
| 3                            | Let $\vec{u} = a\hat{i} + b\hat{j} + c\hat{k}$ , then projection of $\vec{u}$ along $\hat{j}$ is:                                                                                                                                                                                                            | $a$                                                                        | $b$                                 | $c$                           | $\vec{u}$           |
| 4                            | If $\hat{i}$ , $\hat{j}$ and $\hat{k}$ are unit vectors, then $\hat{k} \times \hat{i} =$                                                                                                                                                                                                                     | $-\hat{j}$                                                                 | $\hat{j}$                           | 1                             | 0                   |
| 5                            | If $\alpha$ , $\beta$ and $\gamma$ are direction angles, then $\cos^2 \alpha + \cos^2 \beta =$                                                                                                                                                                                                               | 1                                                                          | $\cos^2 \gamma$                     | $1 - \cos^2 \gamma$           | $-\cos^2 \gamma$    |
| 6                            | A stone falls from the height according to the law $h(x) = 40 - 10x^2$ . It will strike the ground after:                                                                                                                                                                                                    | 2 sec                                                                      | 4 sec                               | 8 sec                         | 10 sec              |
| 7                            | The function $f(x) = \frac{2+3x}{2x}$ is discontinuous at:                                                                                                                                                                                                                                                   | $x = -\frac{2}{3}$                                                         | $x = 1$                             | $x = -3$                      | $x = 0$             |
| 8                            | If $f(x) = e^{2x}$ , then $f'''(x) =$                                                                                                                                                                                                                                                                        | $e^{2x}$                                                                   | $6e^{2x}$                           | $8e^{2x}$                     | $8e^x$              |
| 9                            | The function $f(x) = \sin x$ is increasing in quadrants:                                                                                                                                                                                                                                                     | I & IV                                                                     | II & III                            | I & II                        | III & IV            |
| 10                           | If $y = \sin 3x$ , then $y_2$ is equal to:                                                                                                                                                                                                                                                                   | $3\cos 3x$                                                                 | $-9\sin 3x$                         | $9\cos 3x$                    | $9\sin 3x$          |
| 11                           | The numbers whose sum is 20 and product is maximum are:                                                                                                                                                                                                                                                      | 15, 5                                                                      | 13, 7                               | 12, 8                         | 10, 10              |
| 12                           | $\int_0^3 \frac{dx}{x^2 + 9} =$                                                                                                                                                                                                                                                                              | $\frac{\pi}{4}$                                                            | $\frac{\pi}{6}$                     | $\frac{\pi}{12}$              | $\frac{\pi}{2}$     |
| 13                           | The order of differential equation $4x^2 = \left(\frac{dy}{dx}\right)^2$ is:                                                                                                                                                                                                                                 | 1                                                                          | 2                                   | 3                             | 4                   |
| 14                           | $\int \frac{2}{1+x^2} dx =$                                                                                                                                                                                                                                                                                  | $2 \tan x + c$                                                             | $2 \tan^{-1} x + c$                 | $\frac{1}{2} \tan^{-1} x + c$ | $2 \cot^{-1} x + c$ |
| 15                           | Suitable substitution for $\int \frac{dx}{\sqrt{a^2 - x^2}}$ is:                                                                                                                                                                                                                                             | $x = a \sec \theta$                                                        | $x = a \operatorname{cosec} \theta$ | $x = \sin \theta$             | $x = a \sin \theta$ |
| 16                           | If $x > 0$ , $y > 0$ , then the point $P(x, -y)$ lies in quadrant:                                                                                                                                                                                                                                           | I                                                                          | II                                  | III                           | IV                  |
| 17                           | Distance between the points ( 1, 2 ) and (2, 1 ) is:                                                                                                                                                                                                                                                         | 1                                                                          | 2                                   | $\sqrt{2}$                    | $\sqrt{5}$          |
| 18                           | Perpendicular distance of the line $4x - 3y - 25 = 0$ from the origin is:                                                                                                                                                                                                                                    | 0                                                                          | 5                                   | 25                            | $\frac{25}{7}$      |
| 19                           | The point which is not included in the solution region of $2x - 3y \leq 6$ is:                                                                                                                                                                                                                               | (1, -2)                                                                    | (6, 2)                              | (-2, 1)                       | (3, 2)              |
| 20                           | Radius of the circle $x^2 + y^2 - 6x + 10y - 15 = 0$ is:                                                                                                                                                                                                                                                     | 0                                                                          | 7                                   | $\sqrt{13}$                   | $2\sqrt{13}$        |

|                              |                                                                                                           |                                                                                                                                                                                                                                                                                                              |                                     |                               |                     |
|------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------|---------------------|
| Paper Code<br>Number: 4195   |                                                                                                           | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class)                                                                                                                                                                                                                                   |                                     | Roll No: _____                |                     |
| MATHEMATICS PAPER-II GROUP-I |                                                                                                           |                                                                                                                                                                                                                                                                                                              |                                     |                               |                     |
| TIME ALLOWED: 30 Minutes     |                                                                                                           | OBJECTIVE                                                                                                                                                                                                                                                                                                    |                                     | MAXIMUM MARKS: 20             |                     |
| Q.No.1                       |                                                                                                           | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                     |                               |                     |
| S.#                          | QUESTIONS                                                                                                 | A                                                                                                                                                                                                                                                                                                            | B                                   | C                             | D                   |
| 1                            | The order of differential equation $4x^2 = \left(\frac{dy}{dx}\right)^2$ is:                              | 1                                                                                                                                                                                                                                                                                                            | 2                                   | 3                             | 4                   |
| 2                            | $\int \frac{2}{1+x^2} dx =$                                                                               | $2 \tan x + c$                                                                                                                                                                                                                                                                                               | $2 \tan^{-1} x + c$                 | $\frac{1}{2} \tan^{-1} x + c$ | $2 \cot^{-1} x + c$ |
| 3                            | Suitable substitution for $\int \frac{dx}{\sqrt{a^2 - x^2}}$ is:                                          | $x = a \sec \theta$                                                                                                                                                                                                                                                                                          | $x = a \operatorname{cosec} \theta$ | $x = \sin \theta$             | $x = a \sin \theta$ |
| 4                            | If $x > 0, y > 0$ , then the point $P(x, -y)$ lies in quadrant:                                           | I                                                                                                                                                                                                                                                                                                            | II                                  | III                           | IV                  |
| 5                            | Distance between the points ( 1, 2 ) and (2, 1 ) is:                                                      | 1                                                                                                                                                                                                                                                                                                            | 2                                   | $\sqrt{2}$                    | $\sqrt{5}$          |
| 6                            | Perpendicular distance of the line $4x - 3y - 25 = 0$ from the origin is:                                 | 0                                                                                                                                                                                                                                                                                                            | 5                                   | 25                            | $\frac{25}{7}$      |
| 7                            | The point which is not included in the solution region of $2x - 3y \leq 6$ is:                            | (1, -2)                                                                                                                                                                                                                                                                                                      | (6, 2)                              | (-2, 1)                       | (3, 2)              |
| 8                            | Radius of the circle $x^2 + y^2 - 6x + 10y - 15 = 0$ is:                                                  | 0                                                                                                                                                                                                                                                                                                            | 7                                   | $\sqrt{13}$                   | $2\sqrt{13}$        |
| 9                            | If eccentricity of a conic is less than 1, then it is called:                                             | Parabola                                                                                                                                                                                                                                                                                                     | Circle                              | Hyperbola                     | Ellipse             |
| 10                           | The circles $x^2 + y^2 = 8$ and $x^2 + y^2 = 16$ have:                                                    | Same centres                                                                                                                                                                                                                                                                                                 | Same radius                         | Same tangents                 | Same normals        |
| 11                           | Let $\vec{u} = a\hat{i} + b\hat{j} + c\hat{k}$ , then projection of $\vec{u}$ along $\hat{j}$ is:         | $a$                                                                                                                                                                                                                                                                                                          | $b$                                 | $c$                           | $\vec{u}$           |
| 12                           | If $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors, then $\hat{k} \times \hat{i} =$                     | $-\hat{j}$                                                                                                                                                                                                                                                                                                   | $\hat{j}$                           | 1                             | 0                   |
| 13                           | If $\alpha, \beta$ and $\gamma$ are direction angles, then $\cos^2 \alpha + \cos^2 \beta =$               | 1                                                                                                                                                                                                                                                                                                            | $\cos^2 \gamma$                     | $1 - \cos^2 \gamma$           | $-\cos^2 \gamma$    |
| 14                           | A stone falls from the height according to the law $h(x) = 40 - 10x^2$ . It will strike the ground after: | 2sec                                                                                                                                                                                                                                                                                                         | 4sec                                | 8sec                          | 10sec               |
| 15                           | The function $f(x) = \frac{2+3x}{2x}$ is discontinuous at:                                                | $x = \frac{-2}{3}$                                                                                                                                                                                                                                                                                           | $x = 1$                             | $x = -3$                      | $x = 0$             |
| 16                           | If $f(x) = e^{2x}$ , then $f'''(x) =$                                                                     | $e^{2x}$                                                                                                                                                                                                                                                                                                     | $6e^{2x}$                           | $8e^{2x}$                     | $8e^x$              |
| 17                           | The function $f(x) = \sin x$ is increasing in quadrants:                                                  | I & IV                                                                                                                                                                                                                                                                                                       | II & III                            | I & II                        | III & IV            |
| 18                           | If $y = \sin 3x$ , then $y_2$ is equal to:                                                                | $3 \cos 3x$                                                                                                                                                                                                                                                                                                  | $-9 \sin 3x$                        | $9 \cos 3x$                   | $9 \sin 3x$         |
| 19                           | The numbers whose sum is 20 and product is maximum are:                                                   | 15, 5                                                                                                                                                                                                                                                                                                        | 13, 7                               | 12, 8                         | 10, 10              |
| 20                           | $\int_0^3 \frac{dx}{x^2 + 9} =$                                                                           | $\frac{\pi}{4}$                                                                                                                                                                                                                                                                                              | $\frac{\pi}{6}$                     | $\frac{\pi}{12}$              | $\frac{\pi}{2}$     |

|                              |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                              |                     |
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| Paper Code<br>Number: 4197   |                                                                                                                                                                                                                                                                                                              | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____               |                     |
| MATHEMATICS PAPER-II GROUP-I |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                              |                     |
| TIME ALLOWED: 30 Minutes     |                                                                                                                                                                                                                                                                                                              | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20            |                     |
| Q.No.1                       | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                            |                                     |                              |                     |
| S.#                          | QUESTIONS                                                                                                                                                                                                                                                                                                    | A                                                                          | B                                   | C                            | D                   |
| 1                            | The function $f(x) = \sin x$ is increasing in quadrants:                                                                                                                                                                                                                                                     | I & IV                                                                     | II & III                            | I & II                       | III & IV            |
| 2                            | If $y = \sin 3x$ , then $y_2$ is equal to:                                                                                                                                                                                                                                                                   | $3\cos 3x$                                                                 | $-9\sin 3x$                         | $9\cos 3x$                   | $9\sin 3x$          |
| 3                            | The numbers whose sum is 20 and product is maximum are:                                                                                                                                                                                                                                                      | 15, 5                                                                      | 13, 7                               | 12, 8                        | 10, 10              |
| 4                            | $\int_0^3 \frac{dx}{x^2 + 9} =$                                                                                                                                                                                                                                                                              | $\frac{\pi}{4}$                                                            | $\frac{\pi}{6}$                     | $\frac{\pi}{12}$             | $\frac{\pi}{2}$     |
| 5                            | The order of differential equation $4x^2 = \left(\frac{dy}{dx}\right)^2$ is:                                                                                                                                                                                                                                 | 1                                                                          | 2                                   | 3                            | 4                   |
| 6                            | $\int \frac{2}{1+x^2} dx =$                                                                                                                                                                                                                                                                                  | $2\tan x + c$                                                              | $2\tan^{-1} x + c$                  | $\frac{1}{2}\tan^{-1} x + c$ | $2\cot^{-1} x + c$  |
| 7                            | Suitable substitution for $\int \frac{dx}{\sqrt{a^2 - x^2}}$ is:                                                                                                                                                                                                                                             | $x = a \sec \theta$                                                        | $x = a \operatorname{cosec} \theta$ | $x = \sin \theta$            | $x = a \sin \theta$ |
| 8                            | If $x > 0$ , $y > 0$ , then the point $P(x, -y)$ lies in quadrant:                                                                                                                                                                                                                                           | I                                                                          | II                                  | III                          | IV                  |
| 9                            | Distance between the points (1, 2) and (2, 1) is:                                                                                                                                                                                                                                                            | 1                                                                          | 2                                   | $\sqrt{2}$                   | $\sqrt{5}$          |
| 10                           | Perpendicular distance of the line $4x - 3y - 25 = 0$ from the origin is:                                                                                                                                                                                                                                    | 0                                                                          | 5                                   | 25                           | $\frac{25}{7}$      |
| 11                           | The point which is not included in the solution region of $2x - 3y \leq 6$ is:                                                                                                                                                                                                                               | (1, -2)                                                                    | (6, 2)                              | (-2, 1)                      | (3, 2)              |
| 12                           | Radius of the circle $x^2 + y^2 - 6x + 10y - 15 = 0$ is:                                                                                                                                                                                                                                                     | 0                                                                          | 7                                   | $\sqrt{13}$                  | $2\sqrt{13}$        |
| 13                           | If eccentricity of a conic is less than 1, then it is called:                                                                                                                                                                                                                                                | Parabola                                                                   | Circle                              | Hyperbola                    | Ellipse             |
| 14                           | The circles $x^2 + y^2 = 8$ and $x^2 + y^2 = 16$ have:                                                                                                                                                                                                                                                       | Same centres                                                               | Same radius                         | Same tangents                | Same normals        |
| 15                           | Let $\vec{u} = a\hat{i} + b\hat{j} + c\hat{k}$ , then projection of $\vec{u}$ along $\hat{j}$ is:                                                                                                                                                                                                            | $a$                                                                        | $b$                                 | $c$                          | $\vec{u}$           |
| 16                           | If $\hat{i}$ , $\hat{j}$ and $\hat{k}$ are unit vectors, then $\hat{k} \times \hat{i} =$                                                                                                                                                                                                                     | $-\hat{j}$                                                                 | $\hat{j}$                           | 1                            | 0                   |
| 17                           | If $\alpha$ , $\beta$ and $\gamma$ are direction angles, then $\cos^2 \alpha + \cos^2 \beta =$                                                                                                                                                                                                               | 1                                                                          | $\cos^2 \gamma$                     | $1 - \cos^2 \gamma$          | $-\cos^2 \gamma$    |
| 18                           | A stone falls from the height according to the law $h(x) = 40 - 10x^2$ . It will strike the ground after:                                                                                                                                                                                                    | 2sec                                                                       | 4sec                                | 8sec                         | 10sec               |
| 19                           | The function $f(x) = \frac{2+3x}{2x}$ is discontinuous at:                                                                                                                                                                                                                                                   | $x = \frac{-2}{3}$                                                         | $x = 1$                             | $x = -3$                     | $x = 0$             |
| 20                           | If $f(x) = e^{2x}$ , then $f'''(x) =$                                                                                                                                                                                                                                                                        | $e^{2x}$                                                                   | $6e^{2x}$                           | $8e^{2x}$                    | $8e^x$              |

|                                                                                                       |                                                                                                                                                                                                                                    |                           |                                                                                                                  |
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| INTERMEDIATE PART-II (12 <sup>th</sup> Class)                                                         |                                                                                                                                                                                                                                    | 2024 (2 <sup>nd</sup> -A) | Roll No:                                                                                                         |
| MATHEMATICS PAPER-II GROUP-I                                                                          |                                                                                                                                                                                                                                    |                           |                                                                                                                  |
| TIME ALLOWED: 2.30 Hours                                                                              |                                                                                                                                                                                                                                    | SUBJECTIVE                | MAXIMUM MARKS: 80                                                                                                |
| NOTE: Write same question number and its parts number on answer book, as given in the question paper. |                                                                                                                                                                                                                                    |                           |                                                                                                                  |
| SECTION-I                                                                                             |                                                                                                                                                                                                                                    |                           |                                                                                                                  |
| 2. Attempt any eight parts.                                                                           |                                                                                                                                                                                                                                    |                           | 8 × 2 = 16                                                                                                       |
| (i)                                                                                                   | Find $\frac{f(a+h)-f(a)}{h}$ and justify where $f(x) = \cos x$                                                                                                                                                                     |                           |                                                                                                                  |
| (ii)                                                                                                  | If $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x^2}$ , $x \neq 0$ find $f \circ g(x)$ and $g \circ f(x)$                                                                                                                              |                           |                                                                                                                  |
| (iii)                                                                                                 | Evaluate by using algebraic techniques $\lim_{x \rightarrow a} \frac{x^n - a^n}{x^m - a^m}$                                                                                                                                        |                           |                                                                                                                  |
| (iv)                                                                                                  | If $f(x) = \begin{cases} x+2, & x \leq -1 \\ c+2, & x > -1 \end{cases}$ , find 'c' so that $\lim_{x \rightarrow -1} f(x)$ exists.                                                                                                  |                           |                                                                                                                  |
| (v)                                                                                                   | Find $\frac{dy}{dx}$ by definition if $y = \sqrt{x+2}$                                                                                                                                                                             | (vi)                      | Differentiate with respect to 'x' $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2$                                 |
| (vii)                                                                                                 | Differentiate $y = a^x$ with respect to 'x'.                                                                                                                                                                                       | (viii)                    | Find $\frac{dy}{dx}$ if $y = \sin h^{-1} x^3$                                                                    |
| (ix)                                                                                                  | Find $y_2$ if $y = \sqrt{x} + \frac{1}{\sqrt{x}}$                                                                                                                                                                                  | (x)                       | Show that $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$                                                |
| (xi)                                                                                                  | Define stationary point.                                                                                                                                                                                                           | (xii)                     | Find $\frac{dy}{dx}$ if $xy + y^2 = 2$                                                                           |
| 3. Attempt any eight parts.                                                                           |                                                                                                                                                                                                                                    |                           | 8 × 2 = 16                                                                                                       |
| (i)                                                                                                   | Using differentials, find $\frac{dx}{dy}$ when $x^4 + y^2 = xy^2$                                                                                                                                                                  | (ii)                      | Evaluate $\int \sin^2 x dx$                                                                                      |
| (iii)                                                                                                 | Find the area between the x-axis and the curve $y = \cos \frac{1}{2}x$ from $x = -\pi$ to $x = \pi$                                                                                                                                |                           |                                                                                                                  |
| (iv)                                                                                                  | Define differential equation and give one example also.                                                                                                                                                                            | (v)                       | Evaluate $\int_1^2 \ln x dx$                                                                                     |
| (vi)                                                                                                  | Evaluate $\int e^x \left(\frac{1}{x} + \ln x\right) dx$                                                                                                                                                                            | (vii)                     | Find $\int \frac{\sec^2 x}{\sqrt{\tan x}} dx$                                                                    |
| (viii)                                                                                                | The points A(-5, -2) and B(5, -4) are ends points of a diameter of a circle. Find its centre and radius.                                                                                                                           |                           |                                                                                                                  |
| (ix)                                                                                                  | The xy-coordinate axes are rotated about the origin through the angle. Find the xy-coordinates of the point P with the given xy-coordinates. P(11, -15), $\theta = 60^\circ$                                                       |                           |                                                                                                                  |
| (x)                                                                                                   | Convert $15y - 8x + 3 = 0$ into normal form.                                                                                                                                                                                       |                           |                                                                                                                  |
| (xi)                                                                                                  | Find an equation of each of the lines represented by $20x^2 + 17xy - 24y^2 = 0$                                                                                                                                                    |                           |                                                                                                                  |
| (xii)                                                                                                 | Check whether lines $3x - 4y - 3 = 0$ , $5x + 12y + 1 = 0$ , $32x + 4y - 17 = 0$ are concurrent or not.                                                                                                                            |                           |                                                                                                                  |
| 4. Attempt any nine parts.                                                                            |                                                                                                                                                                                                                                    |                           | 9 × 2 = 18                                                                                                       |
| (i)                                                                                                   | What are the corner points of the solution region?                                                                                                                                                                                 |                           |                                                                                                                  |
| (ii)                                                                                                  | Graph the solution set of $2x + y \geq 2$ in xy-plane.                                                                                                                                                                             |                           |                                                                                                                  |
| (iii)                                                                                                 | Find the equation of circle with ends of a diameter at (-3, 2) and (5, -6)                                                                                                                                                         |                           |                                                                                                                  |
| (iv)                                                                                                  | Find the equation of tangent $x^2 + y^2 = 25$ at (4, 3).                                                                                                                                                                           |                           |                                                                                                                  |
| (v)                                                                                                   | Derive the standard equation of circle.                                                                                                                                                                                            |                           |                                                                                                                  |
| (vi)                                                                                                  | Find vertex and directrix of the parabola $x^2 = 5y$ .                                                                                                                                                                             |                           |                                                                                                                  |
| (vii)                                                                                                 | Find equation of ellipse with foci ( $\pm 3, 0$ ) and minor axis of length 10.                                                                                                                                                     |                           |                                                                                                                  |
| (viii)                                                                                                | Find the eccentricity of hyperbola $y^2 - 4x^2 = 4$                                                                                                                                                                                |                           |                                                                                                                  |
| (ix)                                                                                                  | Let A(2, 5), B(-1, 1) and C(2, -6). Find $2\overrightarrow{CB} - 2\overrightarrow{CA}$                                                                                                                                             |                           |                                                                                                                  |
| (x)                                                                                                   | Find two vectors of length 2, parallel to vector $\underline{v} = 2\underline{i} - 4\underline{j} + 4\underline{k}$                                                                                                                |                           |                                                                                                                  |
| (xi)                                                                                                  | Calculate projection of $\underline{a} = 3\underline{i} + \underline{j} - \underline{k}$ along $\underline{b} = -2\underline{i} - \underline{j} + \underline{k}$                                                                   |                           |                                                                                                                  |
| (xii)                                                                                                 | Find a unit vector perpendicular to plane containing $\underline{a}$ and $\underline{b}$ ; $\underline{a} = -\underline{i} - \underline{j} - \underline{k}$ and $\underline{b} = 2\underline{i} - 3\underline{j} + 4\underline{k}$ |                           |                                                                                                                  |
| (xiii)                                                                                                | Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k}$ , $-2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are coplanar.                                 |                           |                                                                                                                  |
| SECTION-II                                                                                            |                                                                                                                                                                                                                                    |                           |                                                                                                                  |
| NOTE: Attempt any three questions.                                                                    |                                                                                                                                                                                                                                    |                           | 3 × 10 = 30                                                                                                      |
| 5.(a)                                                                                                 | Evaluate the limit $\lim_{x \rightarrow 0} \frac{\sec x - \cos x}{x}$                                                                                                                                                              | (b)                       | If $(1 + \tan x) \tan y = 1 - \tan x$ , show that $\frac{dy}{dx} = -1$                                           |
| 6.(a)                                                                                                 | If $x = \sin \theta$ , $y = \sin m\theta$ , show that $(1 - x^2)y_2 - xy_1 + m^2y = 0$                                                                                                                                             | (b)                       | Evaluate $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$                                                              |
| 7.(a)                                                                                                 | Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \frac{\cos x}{\sin x(2 + \sin x)} dx$                                                                                                                                               | (b)                       | Minimize $z = 3x + y$ , subject to the constraints $3x + 5y \geq 15$ ; $x + 6y \geq 9$ ; $x \geq 0$ ; $y \geq 0$ |
| 8.(a)                                                                                                 | Show that the circles $x^2 + y^2 + 2x - 8 = 0$ and $x^2 + y^2 - 6x + 6y - 46 = 0$ touch internally.                                                                                                                                |                           |                                                                                                                  |
| (b)                                                                                                   | Prove that $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$ using vectors.                                                                                                                                 |                           |                                                                                                                  |
| 9.(a)                                                                                                 | Find the centre, foci, eccentricity, vertices and directrices of the ellipse $\frac{(2x-1)^2}{4} + \frac{(y+2)^2}{16} = 1$                                                                                                         |                           |                                                                                                                  |
| (b)                                                                                                   | The points (4, -2), (-2, 4) and (5, 5) are the vertices of a triangle. Find in-centre of the triangle.                                                                                                                             |                           |                                                                                                                  |

| Paper Code<br>Number: 4194                                                                                                                                                                                                                                                                                          |                                                                           | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____                                                                    |                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------|
| MATHEMATICS PAPER-II GROUP-II                                                                                                                                                                                                                                                                                       |                                                                           |                                                                            |                                     |                                                                                   |                                        |
| TIME ALLOWED: 30 Minutes                                                                                                                                                                                                                                                                                            |                                                                           | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20                                                                 |                                        |
| Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                           |                                                                            |                                     |                                                                                   |                                        |
| S.#                                                                                                                                                                                                                                                                                                                 | QUESTIONS                                                                 | A                                                                          | B                                   | C                                                                                 | D                                      |
| 1                                                                                                                                                                                                                                                                                                                   | $\int \frac{1}{ax+b} dx = ?$                                              | $\frac{1}{a} \ln(ax+b)+c$                                                  | $\ln(ax+b)+c$                       | $\frac{1}{b} \ln(ax+b)+c$                                                         | $a \ln(ax+b)+c$                        |
| 2                                                                                                                                                                                                                                                                                                                   | $\int \frac{\sec^2 x}{\tan x} dx = ?$                                     | $\tan x + c$                                                               | $\ln(\tan x) + c$                   | $\cot x + c$                                                                      | $\ln(\cot x) + c$                      |
| 3                                                                                                                                                                                                                                                                                                                   | If $\int x e^{x^2} dx = k e^{x^2}$ then $k = ?$                           | $\frac{1}{3}$                                                              | $\frac{x}{2}$                       | $\frac{1}{2}$                                                                     | $\frac{x}{3}$                          |
| 4                                                                                                                                                                                                                                                                                                                   | Distance of a point $(1, -2)$ from $y$ -axis is:                          | 2                                                                          | 3                                   | 4                                                                                 | 1                                      |
| 5                                                                                                                                                                                                                                                                                                                   | Slope of line bisecting 1 <sup>st</sup> and 3 <sup>rd</sup> quadrant is:  | 1                                                                          | $\frac{\pi}{4}$                     | 0                                                                                 | -1                                     |
| 6                                                                                                                                                                                                                                                                                                                   | Equation of line passing through $(5, -7)$ having slope un-defined is:    | $y = -7$                                                                   | $x = 5$                             | $x = -5$                                                                          | $y = 7$                                |
| 7                                                                                                                                                                                                                                                                                                                   | $x = 5$ is solution of in-equality:                                       | $2x - 3 > 0$                                                               | $2x + 3 < 0$                        | $x + 4 < 0$                                                                       | $x < 0$                                |
| 8                                                                                                                                                                                                                                                                                                                   | Length of latusrectum of parabola $x^2 = 5y$ is:                          | 5                                                                          | $\frac{5}{4}$                       | 20                                                                                | 10                                     |
| 9                                                                                                                                                                                                                                                                                                                   | Equation of tangent to circle $x^2 + y^2 = 4$ at $(2, 0)$ is:             | $x = 1$                                                                    | $y = 2$                             | $x = 2$                                                                           | $y = 1$                                |
| 10                                                                                                                                                                                                                                                                                                                  | Equation $Ax^2 + By^2 + Gx + Fy + C = 0$ represent an ellipse if:         | Either $A = 0$ or $B = 0$                                                  | $A \neq B$ but opposite sign        | $A = B$                                                                           | $A \neq B$ but same sign               |
| 11                                                                                                                                                                                                                                                                                                                  | Unit vector perpendicular to both $\underline{u}$ and $\underline{v}$ is: | $\underline{u} \times \underline{v}$                                       | $\underline{u} \cdot \underline{v}$ | $\frac{\underline{u} \times \underline{v}}{ \underline{u} \times \underline{v} }$ | $ \underline{u} \times \underline{v} $ |
| 12                                                                                                                                                                                                                                                                                                                  | Projection of $\underline{a}$ along $\underline{b}$ is:                   | $\underline{a} - \underline{b}$                                            | $\underline{a} + \underline{b}$     | $\hat{a} \cdot \underline{b}$                                                     | $\underline{a} \cdot \hat{b}$          |
| 13                                                                                                                                                                                                                                                                                                                  | Magnitude of a vector is also called:                                     | Norm                                                                       | Parameter                           | Variable                                                                          | Point                                  |
| 14                                                                                                                                                                                                                                                                                                                  | $2 \sin hx =$                                                             | $\frac{e^x + e^{-x}}{2}$                                                   | $\frac{e^x - e^{-x}}{2}$            | $e^x + e^{-x}$                                                                    | $e^x - e^{-x}$                         |
| 15                                                                                                                                                                                                                                                                                                                  | Domain of $g(x) = 2x - 5$ is:                                             | $R - \{0\}$                                                                | $R - \{1\}$                         | $R$                                                                               | $R - \{-1\}$                           |
| 16                                                                                                                                                                                                                                                                                                                  | If $f(x) = (1+x)^n$ then $f'(0)$ will be:                                 | 0                                                                          | $n$                                 | 1                                                                                 | $n!$                                   |
| 17                                                                                                                                                                                                                                                                                                                  | Derivative of $\cos x$ with respect to $\cos x$ is:                       | 1                                                                          | 0                                   | $\sin x$                                                                          | $\cos x$                               |
| 18                                                                                                                                                                                                                                                                                                                  | $\frac{d}{dx}(e^{x+h}) = ?$                                               | $he^{x+h}$                                                                 | $e^{x+h}$                           | $\frac{e^{x+h}}{h}$                                                               | $\frac{e^{x+h}}{\ln h}$                |
| 19                                                                                                                                                                                                                                                                                                                  | $\frac{d}{dx}(\tan^{-1} x) = ?$                                           | $\frac{1}{1+x^2}$                                                          | $\frac{1}{x^2-1}$                   | $\frac{1}{1-x^2}$                                                                 | $\frac{1}{\sqrt{x^2-1}}$               |
| 20                                                                                                                                                                                                                                                                                                                  | $\int \frac{d}{dx}[f(x)] dx$ is equal to:                                 | $f'(x) + c$                                                                | $\frac{1}{2}[f(x)]^2 + c$           | $\frac{1}{2}f(x) + c$                                                             | $f(x) + c$                             |

|                               |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                                                                                   |                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------|
| Part Code<br>Number: 4192     |                                                                                                                                                                                                                                                                                                              | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____                                                                    |                                        |
| MATHEMATICS PAPER-II GROUP-II |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                                                                                   |                                        |
| TIME ALLOWED: 30 Minutes      |                                                                                                                                                                                                                                                                                                              | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20                                                                 |                                        |
| Q.No.1                        | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                            |                                     |                                                                                   |                                        |
| S.#                           | QUESTIONS                                                                                                                                                                                                                                                                                                    | A                                                                          | B                                   | C                                                                                 | D                                      |
| 1                             | $2 \sin hx =$                                                                                                                                                                                                                                                                                                | $\frac{e^x + e^{-x}}{2}$                                                   | $\frac{e^x - e^{-x}}{2}$            | $e^x + e^{-x}$                                                                    | $e^x - e^{-x}$                         |
| 2                             | Domain of $g(x) = 2x - 5$ is:                                                                                                                                                                                                                                                                                | $R - \{0\}$                                                                | $R - \{1\}$                         | $R$                                                                               | $R - \{-1\}$                           |
| 3                             | If $f(x) = (1+x)^n$ then $f'(0)$ will be:                                                                                                                                                                                                                                                                    | 0                                                                          | $n$                                 | 1                                                                                 | $n!$                                   |
| 4                             | Derivative of $\cos x$ with respect to $\cos x$ is:                                                                                                                                                                                                                                                          | 1                                                                          | 0                                   | $\sin x$                                                                          | $\cos x$                               |
| 5                             | $\frac{d}{dx}(e^{x+h}) = ?$                                                                                                                                                                                                                                                                                  | $he^{x+h}$                                                                 | $e^{x+h}$                           | $\frac{e^{x+h}}{h}$                                                               | $\frac{e^{x+h}}{\ln h}$                |
| 6                             | $\frac{d}{dx}(\tan h^{-1}x) = ?$                                                                                                                                                                                                                                                                             | $\frac{1}{1+x^2}$                                                          | $\frac{1}{x^2-1}$                   | $\frac{1}{1-x^2}$                                                                 | $\frac{1}{\sqrt{x^2-1}}$               |
| 7                             | $\int \frac{d}{dx}[f(x)] dx$ is equal to:                                                                                                                                                                                                                                                                    | $f'(x) + c$                                                                | $\frac{1}{2}[f(x)]^2 + c$           | $\frac{1}{2}f(x) + c$                                                             | $f(x) + c$                             |
| 8                             | $\int \frac{1}{ax+b} dx = ?$                                                                                                                                                                                                                                                                                 | $\frac{1}{a} \ln(ax+b) + c$                                                | $\ln(ax+b) + c$                     | $\frac{1}{b} \ln(ax+b) + c$                                                       | $a \ln(ax+b) + c$                      |
| 9                             | $\int \frac{\sec^2 x}{\tan x} dx = ?$                                                                                                                                                                                                                                                                        | $\tan x + c$                                                               | $\ln(\tan x) + c$                   | $\cot x + c$                                                                      | $\ln(\cot x) + c$                      |
| 10                            | If $\int xe^{x^2} dx = ke^{x^2}$ then $k = ?$                                                                                                                                                                                                                                                                | $\frac{1}{3}$                                                              | $\frac{x}{2}$                       | $\frac{1}{2}$                                                                     | $\frac{x}{3}$                          |
| 11                            | Distance of a point $(1, -2)$ from $y$ -axis is:                                                                                                                                                                                                                                                             | 2                                                                          | 3                                   | 4                                                                                 | 1                                      |
| 12                            | Slope of line bisecting 1 <sup>st</sup> and 3 <sup>rd</sup> quadrant is:                                                                                                                                                                                                                                     | 1                                                                          | $\frac{\pi}{4}$                     | 0                                                                                 | -1                                     |
| 13                            | Equation of line passing through $(5, -7)$ having slope un-defined is:                                                                                                                                                                                                                                       | $y = -7$                                                                   | $x = 5$                             | $x = -5$                                                                          | $y = 7$                                |
| 14                            | $x = 5$ is solution of in-equality:                                                                                                                                                                                                                                                                          | $2x - 3 > 0$                                                               | $2x + 3 < 0$                        | $x + 4 < 0$                                                                       | $x < 0$                                |
| 15                            | Length of latusrectum of parabola $x^2 = 5y$ is:                                                                                                                                                                                                                                                             | 5                                                                          | $\frac{5}{4}$                       | 20                                                                                | 10                                     |
| 16                            | Equation of tangent to circle $x^2 + y^2 = 4$ at $(2, 0)$ is:                                                                                                                                                                                                                                                | $x = 1$                                                                    | $y = 2$                             | $x = 2$                                                                           | $y = 1$                                |
| 17                            | Equation $Ax^2 + By^2 + Gx + Fy + C = 0$ represent an ellipse if:                                                                                                                                                                                                                                            | Either $A = 0$ or $B = 0$                                                  | $A \neq B$ but opposite sign        | $A = B$                                                                           | $A \neq B$ but same sign               |
| 18                            | Unit vector perpendicular to both $\underline{u}$ and $\underline{v}$ is:                                                                                                                                                                                                                                    | $\underline{u} \times \underline{v}$                                       | $\underline{u} \cdot \underline{v}$ | $\frac{\underline{u} \times \underline{v}}{ \underline{u} \times \underline{v} }$ | $ \underline{u} \times \underline{v} $ |
| 19                            | Projection of $\underline{a}$ along $\underline{b}$ is:                                                                                                                                                                                                                                                      | $\underline{a} - \underline{b}$                                            | $\underline{a} + \underline{b}$     | $\hat{a} \cdot \underline{b}$                                                     | $\underline{a} \cdot \hat{b}$          |
| 20                            | Magnitude of a vector is also called:                                                                                                                                                                                                                                                                        | Norm                                                                       | Parameter                           | Variable                                                                          | Point                                  |

|                               |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                                                                                   |                                        |
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| Paper Code<br>Number: 4196    |                                                                                                                                                                                                                                                                                                              | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class) |                                     | Roll No: _____                                                                    |                                        |
| MATHEMATICS PAPER-II GROUP-II |                                                                                                                                                                                                                                                                                                              |                                                                            |                                     |                                                                                   |                                        |
| TIME ALLOWED: 30 Minutes      |                                                                                                                                                                                                                                                                                                              | OBJECTIVE                                                                  |                                     | MAXIMUM MARKS: 20                                                                 |                                        |
| Q.No.1                        | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                                                            |                                     |                                                                                   |                                        |
| S.#                           | QUESTIONS                                                                                                                                                                                                                                                                                                    | A                                                                          | B                                   | C                                                                                 | D                                      |
| 1                             | Equation $Ax^2 + By^2 + Gx + Fy + C = 0$ represent an ellipse if:                                                                                                                                                                                                                                            | Either $A = 0$ or $B = 0$                                                  | $A \neq B$ but opposite sign        | $A = B$                                                                           | $A \neq B$ but same sign               |
| 2                             | Unit vector perpendicular to both $\underline{u}$ and $\underline{v}$ is:                                                                                                                                                                                                                                    | $\underline{u} \times \underline{v}$                                       | $\underline{u} \cdot \underline{v}$ | $\frac{\underline{u} \times \underline{v}}{ \underline{u} \times \underline{v} }$ | $ \underline{u} \times \underline{v} $ |
| 3                             | Projection of $\underline{a}$ along $\underline{b}$ is:                                                                                                                                                                                                                                                      | $\underline{a} - \underline{b}$                                            | $\underline{a} + \underline{b}$     | $\hat{a} \cdot \underline{b}$                                                     | $\underline{a} \cdot \hat{b}$          |
| 4                             | Magnitude of a vector is also called:                                                                                                                                                                                                                                                                        | Norm                                                                       | Parameter                           | Variable                                                                          | Point                                  |
| 5                             | $2 \sinh x =$                                                                                                                                                                                                                                                                                                | $\frac{e^x + e^{-x}}{2}$                                                   | $\frac{e^x - e^{-x}}{2}$            | $e^x + e^{-x}$                                                                    | $e^x - e^{-x}$                         |
| 6                             | Domain of $g(x) = 2x - 5$ is:                                                                                                                                                                                                                                                                                | $R - \{0\}$                                                                | $R - \{1\}$                         | $R$                                                                               | $R - \{-1\}$                           |
| 7                             | If $f(x) = (1+x)^n$ then $f'(0)$ will be:                                                                                                                                                                                                                                                                    | 0                                                                          | $n$                                 | 1                                                                                 | $n!$                                   |
| 8                             | Derivative of $\cos x$ with respect to $\cos x$ is:                                                                                                                                                                                                                                                          | 1                                                                          | 0                                   | $\sin x$                                                                          | $\cos x$                               |
| 9                             | $\frac{d}{dx}(e^{x+h}) = ?$                                                                                                                                                                                                                                                                                  | $he^{x+h}$                                                                 | $e^{x+h}$                           | $\frac{e^{x+h}}{h}$                                                               | $\frac{e^{x+h}}{\ln h}$                |
| 10                            | $\frac{d}{dx}(\tan^{-1} x) = ?$                                                                                                                                                                                                                                                                              | $\frac{1}{1+x^2}$                                                          | $\frac{1}{x^2-1}$                   | $\frac{1}{1-x^2}$                                                                 | $\frac{1}{\sqrt{x^2-1}}$               |
| 11                            | $\int \frac{d}{dx}[f(x)] dx$ is equal to:                                                                                                                                                                                                                                                                    | $f'(x) + c$                                                                | $\frac{1}{2}[f(x)]^2 + c$           | $\frac{1}{2}f(x) + c$                                                             | $f(x) + c$                             |
| 12                            | $\int \frac{1}{ax+b} dx = ?$                                                                                                                                                                                                                                                                                 | $\frac{1}{a} \ln(ax+b) + c$                                                | $\ln(ax+b) + c$                     | $\frac{1}{b} \ln(ax+b) + c$                                                       | $a \ln(ax+b) + c$                      |
| 13                            | $\int \frac{\sec^2 x}{\tan x} dx = ?$                                                                                                                                                                                                                                                                        | $\tan x + c$                                                               | $\ln(\tan x) + c$                   | $\cot x + c$                                                                      | $\ln(\cot x) + c$                      |
| 14                            | If $\int xe^{x^2} dx = ke^{x^2}$ then $k = ?$                                                                                                                                                                                                                                                                | $\frac{1}{3}$                                                              | $\frac{x}{2}$                       | $\frac{1}{2}$                                                                     | $\frac{x}{3}$                          |
| 15                            | Distance of a point $(1, -2)$ from $y$ -axis is:                                                                                                                                                                                                                                                             | 2                                                                          | 3                                   | 4                                                                                 | 1                                      |
| 16                            | Slope of line bisecting 1 <sup>st</sup> and 3 <sup>rd</sup> quadrant is:                                                                                                                                                                                                                                     | 1                                                                          | $\frac{\pi}{4}$                     | 0                                                                                 | -1                                     |
| 17                            | Equation of line passing through $(5, -7)$ having slope un-defined is:                                                                                                                                                                                                                                       | $y = -7$                                                                   | $x = 5$                             | $x = -5$                                                                          | $y = 7$                                |
| 18                            | $x = 5$ is solution of in-equality:                                                                                                                                                                                                                                                                          | $2x - 3 > 0$                                                               | $2x + 3 < 0$                        | $x + 4 < 0$                                                                       | $x < 0$                                |
| 19                            | Length of latusrectum of parabola $x^2 = 5y$ is:                                                                                                                                                                                                                                                             | 5                                                                          | $\frac{5}{4}$                       | 20                                                                                | 10                                     |
| 20                            | Equation of tangent to circle $x^2 + y^2 = 4$ at $(2, 0)$ is:                                                                                                                                                                                                                                                | $x = 1$                                                                    | $y = 2$                             | $x = 2$                                                                           | $y = 1$                                |

|                               |                                                                           |                                                                                                                                                                                                                                                                                                              |                                     |                                                                                   |                                        |
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| Paper Code<br>Number: 4198    |                                                                           | 2024 (2 <sup>nd</sup> -A)<br>INTERMEDIATE PART-II (12 <sup>th</sup> Class)                                                                                                                                                                                                                                   |                                     | Roll No: _____                                                                    |                                        |
| MATHEMATICS PAPER-II GROUP-II |                                                                           |                                                                                                                                                                                                                                                                                                              |                                     |                                                                                   |                                        |
| TIME ALLOWED: 30 Minutes      |                                                                           | OBJECTIVE                                                                                                                                                                                                                                                                                                    |                                     | MAXIMUM MARKS: 20                                                                 |                                        |
| Q.No.1                        |                                                                           | You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. |                                     |                                                                                   |                                        |
| S.#                           | QUESTIONS                                                                 | A                                                                                                                                                                                                                                                                                                            | B                                   | C                                                                                 | D                                      |
| 1                             | Unit vector perpendicular to both $\underline{u}$ and $\underline{v}$ is: | $\underline{u} \times \underline{v}$                                                                                                                                                                                                                                                                         | $\underline{u} \cdot \underline{v}$ | $\frac{\underline{u} \times \underline{v}}{ \underline{u} \times \underline{v} }$ | $ \underline{u} \times \underline{v} $ |
| 2                             | Projection of $\underline{a}$ along $\underline{b}$ is:                   | $\underline{a} - \underline{b}$                                                                                                                                                                                                                                                                              | $\underline{a} + \underline{b}$     | $\hat{a} \cdot \underline{b}$                                                     | $\underline{a} \cdot \hat{b}$          |
| 3                             | Magnitude of a vector is also called:                                     | Norm                                                                                                                                                                                                                                                                                                         | Parameter                           | Variable                                                                          | Point                                  |
| 4                             | $2 \sin hx =$                                                             | $\frac{e^x + e^{-x}}{2}$                                                                                                                                                                                                                                                                                     | $\frac{e^x - e^{-x}}{2}$            | $e^x + e^{-x}$                                                                    | $e^x - e^{-x}$                         |
| 5                             | Domain of $g(x) = 2x - 5$ is:                                             | $R - \{0\}$                                                                                                                                                                                                                                                                                                  | $R - \{1\}$                         | $R$                                                                               | $R - \{-1\}$                           |
| 6                             | If $f(x) = (1+x)^n$ then $f'(0)$ will be:                                 | 0                                                                                                                                                                                                                                                                                                            | $n$                                 | 1                                                                                 | $n!$                                   |
| 7                             | Derivative of $\cos x$ with respect to $\cos x$ is:                       | 1                                                                                                                                                                                                                                                                                                            | 0                                   | $\sin x$                                                                          | $\cos x$                               |
| 8                             | $\frac{d}{dx}(e^{x+h}) = ?$                                               | $he^{x+h}$                                                                                                                                                                                                                                                                                                   | $e^{x+h}$                           | $\frac{e^{x+h}}{h}$                                                               | $\frac{e^{x+h}}{\ln h}$                |
| 9                             | $\frac{d}{dx}(\tan^{-1}x) = ?$                                            | $\frac{1}{1+x^2}$                                                                                                                                                                                                                                                                                            | $\frac{1}{x^2-1}$                   | $\frac{1}{1-x^2}$                                                                 | $\frac{1}{\sqrt{x^2-1}}$               |
| 10                            | $\int \frac{d}{dx}[f(x)] dx$ is equal to:                                 | $f'(x) + c$                                                                                                                                                                                                                                                                                                  | $\frac{1}{2}[f(x)]^2 + c$           | $\frac{1}{2}f(x) + c$                                                             | $f(x) + c$                             |
| 11                            | $\int \frac{1}{ax+b} dx = ?$                                              | $\frac{1}{a} \ln(ax+b) + c$                                                                                                                                                                                                                                                                                  | $\ln(ax+b) + c$                     | $\frac{1}{b} \ln(ax+b) + c$                                                       | $a \ln(ax+b) + c$                      |
| 12                            | $\int \frac{\sec^2 x}{\tan x} dx = ?$                                     | $\tan x + c$                                                                                                                                                                                                                                                                                                 | $\ln(\tan x) + c$                   | $\cot x + c$                                                                      | $\ln(\cot x) + c$                      |
| 13                            | If $\int xe^{x^2} dx = ke^{x^2}$ then $k = ?$                             | $\frac{1}{3}$                                                                                                                                                                                                                                                                                                | $\frac{x}{2}$                       | $\frac{1}{2}$                                                                     | $\frac{x}{3}$                          |
| 14                            | Distance of a point $(1, -2)$ from $y$ -axis is:                          | 2                                                                                                                                                                                                                                                                                                            | 3                                   | 4                                                                                 | 1                                      |
| 15                            | Slope of line bisecting 1 <sup>st</sup> and 3 <sup>rd</sup> quadrant is:  | 1                                                                                                                                                                                                                                                                                                            | $\frac{\pi}{4}$                     | 0                                                                                 | -1                                     |
| 16                            | Equation of line passing through $(5, -7)$ having slope un-defined is:    | $y = -7$                                                                                                                                                                                                                                                                                                     | $x = 5$                             | $x = -5$                                                                          | $y = 7$                                |
| 17                            | $x = 5$ is solution of in-equality:                                       | $2x - 3 > 0$                                                                                                                                                                                                                                                                                                 | $2x + 3 < 0$                        | $x + 4 < 0$                                                                       | $x < 0$                                |
| 18                            | Length of latusrectum of parabola $x^2 = 5y$ is:                          | 5                                                                                                                                                                                                                                                                                                            | $\frac{5}{4}$                       | 20                                                                                | 10                                     |
| 19                            | Equation of tangent to circle $x^2 + y^2 = 4$ at $(2, 0)$ is:             | $x = 1$                                                                                                                                                                                                                                                                                                      | $y = 2$                             | $x = 2$                                                                           | $y = 1$                                |
| 20                            | Equation $Ax^2 + By^2 + Gx + Fy + C = 0$ represent an ellipse if:         | Either $A = 0$ or $B = 0$                                                                                                                                                                                                                                                                                    | $A \neq B$ but opposite sign        | $A = B$                                                                           | $A \neq B$ but same sign               |

|                                                                                                       |                                                                                                                                                                                                                         |                           |                                                                                                                        |                                                       |  |
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| INTERMEDIATE PART-II (12 <sup>th</sup> Class)                                                         |                                                                                                                                                                                                                         | 2024 (2 <sup>nd</sup> -A) |                                                                                                                        | Roll No: _____                                        |  |
| MATHEMATICS PAPER-II GROUP-II                                                                         |                                                                                                                                                                                                                         |                           |                                                                                                                        |                                                       |  |
| TIME ALLOWED: 2.30 Hours                                                                              |                                                                                                                                                                                                                         | SUBJECTIVE                |                                                                                                                        | MAXIMUM MARKS: 80                                     |  |
| NOTE: Write same question number and its parts number on answer book, as given in the question paper. |                                                                                                                                                                                                                         |                           |                                                                                                                        |                                                       |  |
| SECTION-I                                                                                             |                                                                                                                                                                                                                         |                           |                                                                                                                        |                                                       |  |
| 2. Attempt any eight parts.                                                                           |                                                                                                                                                                                                                         |                           |                                                                                                                        | 8 × 2 = 16                                            |  |
| (i)                                                                                                   | Determine whether the given function is even or odd $f(x) = x\sqrt{x^2 + 5}$                                                                                                                                            |                           |                                                                                                                        |                                                       |  |
| (ii)                                                                                                  | Without finding the inverse, state the domain and range of $f^{-1}$ where $f(x) = 2 + \sqrt{x-1}$                                                                                                                       |                           |                                                                                                                        |                                                       |  |
| (iii)                                                                                                 | Evaluate the following limit $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin^2 x}$                                                                                                                                       | (iv)                      | Express the given limit in terms of $e$ $\lim_{x \rightarrow 0} (1 + 2x^2)^{\frac{1}{x^2}}$                            |                                                       |  |
| (v)                                                                                                   | Differentiate w.r.t. $x$ $\frac{(x^2 + 1)^2}{x^2 - 1}$                                                                                                                                                                  | (vi)                      | Find $\frac{dy}{dx}$ if $x = at^2$ and $y = 2at$                                                                       |                                                       |  |
| (vii)                                                                                                 | Find $\frac{dy}{dx}$ if $x^2 - 4xy - 5y = 0$                                                                                                                                                                            | (viii)                    | Differentiate the following w.r.t. the variable involved $(\sin 2\theta - \cos 3\theta)^2$                             |                                                       |  |
| (ix)                                                                                                  | Find $\frac{dy}{dx}$ if $y = e^{-x}(x^3 + 2x^2 + 1)$                                                                                                                                                                    | (x)                       | If $y = \sin^{-1} \frac{x}{a}$ find $\frac{dy}{dx}$                                                                    |                                                       |  |
| (xi)                                                                                                  | Find the extreme values for the given function $f(x) = 5x^2 - 6x + 2$                                                                                                                                                   |                           |                                                                                                                        |                                                       |  |
| (xii)                                                                                                 | Find two positive integers whose sum is 9 and the product of one with the square of the other will be maximum.                                                                                                          |                           |                                                                                                                        |                                                       |  |
| 3. Attempt any eight parts.                                                                           |                                                                                                                                                                                                                         |                           |                                                                                                                        | 8 × 2 = 16                                            |  |
| (i)                                                                                                   | Find the approximate increase in the volume of a cube if the length of its each edge changes from 5 to 5.02.                                                                                                            |                           |                                                                                                                        |                                                       |  |
| (ii)                                                                                                  | Evaluate $\int \cos 3x \sin 2x \, dx$                                                                                                                                                                                   | (iii)                     | Find the area bounded by $f(x) = \cos x$ from $x = -\pi/2$ to $x = \pi/2$                                              |                                                       |  |
| (iv)                                                                                                  | Solve the differential equation $(x-1)dx + ydy = 0$                                                                                                                                                                     |                           | (v)                                                                                                                    | Evaluate $\int_2^3 \left(x - \frac{1}{x}\right)^2 dx$ |  |
| (vi)                                                                                                  | Evaluate $\int \frac{xe^x}{(1+x)^2} dx$                                                                                                                                                                                 |                           | (vii)                                                                                                                  | Find $\int \frac{x}{\sqrt{4+x^2}} dx$                 |  |
| (viii)                                                                                                | Find $h$ such that $A(-1, h)$ , $B(3, 2)$ and $C(7, 3)$ are collinear.                                                                                                                                                  |                           |                                                                                                                        |                                                       |  |
| (ix)                                                                                                  | The $xy$ -coordinate axes are translated through the point $O'(4, 6)$ . The coordinates of $P$ are $(2, -3)$ referred to new axes. Find the coordinates of $P$ referred to original axes.                               |                           |                                                                                                                        |                                                       |  |
| (x)                                                                                                   | Find an equation of the line through $(-4, -6)$ and perpendicular to a line having slope $-\frac{3}{2}$ .                                                                                                               |                           |                                                                                                                        |                                                       |  |
| (xi)                                                                                                  | Find the lines represented by $6x^2 - 19xy + 15y^2 = 0$                                                                                                                                                                 |                           |                                                                                                                        |                                                       |  |
| (xii)                                                                                                 | Find the distance between the parallel lines given as $3x - 4y + 3 = 0$ , $3x - 4y + 7 = 0$                                                                                                                             |                           |                                                                                                                        |                                                       |  |
| 4. Attempt any nine parts.                                                                            |                                                                                                                                                                                                                         |                           |                                                                                                                        | 9 × 2 = 18                                            |  |
| (i)                                                                                                   | Define Corner point.                                                                                                                                                                                                    | (ii)                      | Indicate solution set of in-equalities. $4x - 3y \leq 12$ , $x \geq \frac{-3}{2}$                                      |                                                       |  |
| (iii)                                                                                                 | Find radius and centre of the circle. $5x^2 + 5y^2 + 14x + 12y - 10 = 0$                                                                                                                                                |                           |                                                                                                                        |                                                       |  |
| (iv)                                                                                                  | Write down equation of normal to the circle. $x^2 + y^2 = 25$ at $(5\cos\theta, 5\sin\theta)$                                                                                                                           |                           |                                                                                                                        |                                                       |  |
| (v)                                                                                                   | Write equation of parabola with given elements. Focus $(-3, 1)$ , directrix $x - 2y - 3 = 0$                                                                                                                            |                           |                                                                                                                        |                                                       |  |
| (vi)                                                                                                  | Find eccentricity and vertices of ellipse $25x^2 + 9y^2 = 225$                                                                                                                                                          |                           |                                                                                                                        |                                                       |  |
| (vii)                                                                                                 | Write equation of hyperbola with data Foci $(\pm 5, 0)$ , Vertex $(3, 0)$                                                                                                                                               |                           |                                                                                                                        |                                                       |  |
| (viii)                                                                                                | Find equation of tangent to $y^2 = 4ax$ at $(at^2, 2at)$                                                                                                                                                                | (ix)                      | Find unit vector in direction of vector $2\hat{i} - \hat{j}$                                                           |                                                       |  |
| (x)                                                                                                   | Find direction cosines of vector $\overrightarrow{PQ}$ where $P = (2, 1, 5)$ and $Q = (1, 3, 1)$                                                                                                                        |                           |                                                                                                                        |                                                       |  |
| (xi)                                                                                                  | Find a real number ' $\alpha$ ' so that vectors $\underline{u}$ and $\underline{v}$ are perpendicular $\underline{u} = 2\alpha\hat{i} + \hat{j} - \hat{k}$ , $\underline{v} = \hat{i} + \alpha\hat{j} + 4\hat{k}$       |                           |                                                                                                                        |                                                       |  |
| (xii)                                                                                                 | Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$                                     |                           |                                                                                                                        |                                                       |  |
| (xiii)                                                                                                | Find volume of parallelepiped with given vectors as its three edges. $\underline{u} = \hat{i} - 2\hat{j} + 3\hat{k}$ , $\underline{v} = 2\hat{i} - \hat{j} - \hat{k}$ , $\underline{w} = \hat{j} + \hat{k}$             |                           |                                                                                                                        |                                                       |  |
| SECTION-II                                                                                            |                                                                                                                                                                                                                         |                           |                                                                                                                        |                                                       |  |
| NOTE: Attempt any three questions.                                                                    |                                                                                                                                                                                                                         |                           |                                                                                                                        | 3 × 10 = 30                                           |  |
| 5.(a)                                                                                                 | If $f(x) = \begin{cases} \frac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$ find value of $k$ so that $f$ is continuous at $x = 2$                                                             |                           | (b) Differentiate $\sec^{-1} \left( \frac{x^2 + 1}{x^2 - 1} \right)$ w.r.t. ' $x$ '                                    |                                                       |  |
| 6.(a)                                                                                                 | Show that $y = x^x$ has minimum value at $x = \frac{1}{e}$                                                                                                                                                              |                           | (b) Evaluate $\int \tan^3 x \sec x \, dx$                                                                              |                                                       |  |
| 7.(a)                                                                                                 | Evaluate $\int_0^{\pi/4} \frac{1}{1 - \sin x} \, dx$                                                                                                                                                                    |                           | (b) Minimize $f(x, y) = 3x + y$ ; subject to constraints $x + 6y \geq 9$ , $3x + 5y \geq 15$ , $x \geq 0$ ; $y \geq 0$ |                                                       |  |
| 8.(a)                                                                                                 | Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally.                                                                                                                 |                           |                                                                                                                        |                                                       |  |
| (b)                                                                                                   | Prove that the points whose position vectors are $A(-6\hat{i} + 3\hat{j} + 2\hat{k})$ , $B(3\hat{i} - 2\hat{j} + 4\hat{k})$ , $C(5\hat{i} + 7\hat{j} + 3\hat{k})$ , $D(-13\hat{i} + 17\hat{j} - \hat{k})$ are coplanar. |                           |                                                                                                                        |                                                       |  |
| 9.(a)                                                                                                 | Write an equation of the parabola with Axis $y = 0$ , through $(2, 1)$ and $(11, -2)$                                                                                                                                   |                           |                                                                                                                        |                                                       |  |
| (b)                                                                                                   | Show that the lines $4x - 3y - 8 = 0$ ; $3x - 4y - 6 = 0$ and $x - y - 2 = 0$ are concurrent, and the third line bisects the angle formed by the first two lines.                                                       |                           |                                                                                                                        |                                                       |  |