



RAN - 2103000203023001



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S. Y. B. Sc. (Sem. - III) Examination

March - 2023

Mathematics : MTH - 301 : Paper - V

Time: 1 Hour]

[Total Marks: 50

સૂચના : / Instructions

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the details of signs on your answer book

Name of the Examination:

S. Y. B. Sc. (Sem. - III)

Name of the Subject :

Mathematics : MTH - 301 : Paper - V

Subject Code No.: **2103000203023001**

Seat No.:

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Student's Signature

- (2) All questions are compulsory.
- (3) Section I contains 16 questions of 1 mark each.
- (4) Section II contains 17 questions of 2 marks each.
- (5) Use of non-programmable scientific calculator is allowed.

***O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ
O.M.R. Sheetની પાછળ છાપેલ છે.***

***Important instructions to fillup O.M.R. Sheet
are given on back side of the provided O.M.R. Sheet.***

Q. (15) Transformation equations connecting Cartesian coordinates and polar coordinators are _____.

- a) $x = r \sin \theta, y = r$ b) $x = r \cos \theta, y = r$
c) $x = r \sin \theta, y = r \cos \theta$ d) $x = r \cos \theta, y = r \sin \theta$

Q. (16) Under usual notations if $f_x(a, b) = 0 = f_y(a, b)$, $r < 0$, $rt - s^2 > 0$ then $f(a, b)$ is _____.

- a) Maximum value of f
b) Minimum value of f
c) Neither maximum nor minimum
d) Maximum as well as minimum of f

Section - II

Choose the correct option: 02 Marks

[34]

Q. (17) If $\vec{r} = (1 + \sin t)\hat{i} + (1 - \cos t)\hat{j} + 3t^2\hat{K}$, then velocity $\vec{v} =$ _____.

- a) $\cos t \hat{i} - \cos t \hat{j} + 6t \hat{K}$ b) $\cos t \hat{i} + \sin t \hat{j} + 6t \hat{K}$
c) $-\sin t \hat{i} + \cos t \hat{j} + 6t \hat{K}$ d) $\cos t \hat{i} - \sin t \hat{j} + 6 \hat{K}$

Q. (18) If \vec{u} and \vec{v} are two vector functions then $\text{div}(\vec{u} \times \vec{v}) =$ _____.

- a) $\vec{v} \cdot \text{curl}(\vec{u}) - \vec{u} \cdot \text{curl}(\vec{v})$ b) $\vec{v} \cdot \text{curl}(\vec{v}) - \vec{u} \cdot \text{curl}(\vec{u})$
c) $\vec{u} \cdot \text{curl}(\vec{u}) - \vec{v} \cdot \text{curl}(\vec{v})$ d) $\vec{u} \cdot \text{curl}(\vec{v}) - \vec{v} \cdot \text{curl}(\vec{u})$

Q. (19) If $\vec{F} = 3xy \hat{i} - y^2 \hat{j}$ then $\int_C \vec{F} \cdot d\vec{r} =$ _____, where C is the curve, in the xy plane, $y = 2x^2$ from (0, 0) to (1, 2).

- a) $-7/6$ b) $-6/7$
c) $7/6$ d) $6/7$

Q. (32) The gradient of $f(x, y) = x^2 + y$ is equal to _____.

a) 0

b) $2x \vec{i} + \vec{j}$

c) 1

d) $xy \vec{i} + y \vec{j}$

Q. (33) The curl of $\vec{u} = x^2y \vec{i} + xy \vec{j} + yz \vec{k}$ at $(0, 0, 1)$ is equal to _____.

a) 0

b) \vec{j}

c) 1

d) \vec{i}

SPACE FOR ROUGH WORK