B. S.C. Sem.4 Maths

: નોંધ :

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૨. પ્રશ્ન : ૧**[a]** અથવા ૧**[a(i)]** અને ૧**[a(ii)]** તથા ૨**[a]** અથવા ૨**[a(i)]** અને ૨**[a(ii)]** ના **14** માર્કસ ના બદલે ૧૮ માર્કસ રહેશે.

૩. પ્રશ્ન : ૩**[a]** અથવા ૩**[a(i)]** અને ૩**[a(ii)]** તથા ૪**[a]** અથવા ૪**[a(i)]** અને ૪**[a(ii)]** ના **14** માર્કસ ના બદલે ૧૭ માર્કસ રહેશે.

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B.SC.SEM- IV

Mathematics: Paper no. MAT-CC-404 CODE:21017/21038

Linear Algebra-II & Numerical Analysis-II

Total marks - 70

Q.1 A If $T: \mathbb{R}^2 \to \mathbb{R}^2$ is a linear map defined by $T(x, y)=(x+y, y)$ then find $[T;B_1,B_2]$, where $B_1=\{(1,0),(1,1)\}$ and $B_2=\{(0,1,),(2,0)\}$ and also obtain linear transformation associated with a matrix $A=\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}$. 14

OR

A(i) State and prove Schwartz's inequality. 07

A(ii) Prove that an orthogonal set of non zero vectors in inner product space is linearly independent. 07

B Choose any four questions out of the following six questions. 04

(i) Find the linear map associated with identity real matrix of order 2.

(ii) What is the dimension of a vector space $L(\mathbb{R}^2, \mathbb{R}^3)$?

(iii) Write a statement of triangular inequality.

(iv) True/False : Every inner product space is a vector space.

(v) Find an element in inner product space which is orthogonal to every other element.

(vi) Find an orthonormal basis of $\{(2,0),(2,2)\}$.

Q.2 A Derive stirling interpolation formula and using its derive its derivatives formula. 14

OR

A(i) Derive Newton Divided Difference formula. 07

A(ii) Derive Bessel's interpolation formula. 07

B Choose any four questions out of the following six questions. 04

(i) For interpolation near the middle of a table, Bessel's formula is most efficient near p=..... (a)1/2 (b)1 (c)1/9 (d)2

(ii) When the arguments are not equally spaced which formula is useful?
(a)Lagrange's (b)Stirling (c)Bessel's (d)Everett's

(iii) Stirling interpolation formula gives good estimate when .....
(a) $-\frac{1}{4} \leq p \leq \frac{1}{4}$ (b)$-1 \leq p \leq 1$ (c)$-2 \leq p \leq 2$ (d)None of these

(iv) Which formula contains only even differences?
(a)Everett's (b) sterling (c)Bessel's (d)Lagrange's

(v) Write a relation between divided difference and forward difference.

(vi) Define Divided difference.

Q.3 A Derive a general quadrature rule and using its derive Simpson's $\frac{3}{8}$ rule. 14

OR

A(i) Discuss Newton's cotes formula. 07

A(ii) Find the sum of the second power of the first n natural numbers by using Euler-Maclaurin formula. 07

B Choose any three questions out of the following five questions. 03

(i) Define numerical integration.

(ii) General quadrature formula derive by using ..... formula.
(a)Newton's forward (b)Newton's backward
(c)Gauss forward (d)Gauss backward

(iii) Write Trapezoidal rule.

(iv) Simpson's $\frac{1}{3}$ rule derive by put n=..... in general quadrature formula.
(a)6 (b)1 (c)2 (d) 3

(v) Weddle's rule requires the division of the whole range into a multiple of .....number of subintervals.
(a)1 (b)2 (c)4 (d)6

Q.4 A Discuss false position method and Newton Raphson method. 14

OR

A(i) Discuss Euler's method. 07

A(ii) Discuss Picard's method. 07

B Choose any three questions out of the following five questions. 03

(i) Write a condition for the sequence of approximations converges to a root in iteration method.

(ii) Newton-Raphson method has a ..... order of convergence.
(a)0 (b)1 (c)2 (d)3

(iii) Which method is not useful for finding an approximate solution of first order differential equation ?
(a)Runge-Kutta (b)Newton-Raphson (c)Taylor's series (d)Euler

(iv) Which method yield the solution in series form ?
(a)Runge-Kutta (b)Newton-Raphson (c)Taylor's series (d)Euler

(v) Milne's formula derive by using ..... formula.
(a)Newton's forward (b)Newton's backward
(c)Gauss forward (d)Gauss backward