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Siddaganga Institute of Technology, Tumakuru – 572 103

(An Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi, Approved by AICTE, New Delhi)

Course : **B.E** | **TEST - 2** | ODD : 2020-21

Branch: **CSE and ISE** | **December 2020** | Sem : **Third**

Mathematical Concepts for Information Technology

Time: 1 ½ Hours **Max. Marks: 50**

		Answer all the questions	Marks	BL	COs	POs
1	a)	The pressure and volume of a gas are related by the equation $pv^{\gamma} = k$ ***where*** γ ***and*** k are constants. Fit this equation to the following set of observations:	5	3	4	1

p	0.5	1	1.5	2	2.5
v	1.62	1	0.75	0.62	0.52

	b)	Derive $r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2\sigma_x\sigma_y}$ with usual notations.	5	2	4	1
	c)	In the following table are recorded data showing the test scores made by salesmen on an intelligence test and their weekly sales:	6	3	4	1

Test scores	40	70	60	80	50	90
Sales	2.5	6.0	5.0	4.5	2.0	5.5

Obtain the regression line of sales on test scores. Also, estimate the most probable weekly sales volume if a salesman makes a score of 57.

2	a)	A simply supported beam carries a concentrated load P at its midpoint. Corresponding to various values of P, the maximum deflection y is measured. The data is as follows.	5	3	4	1

P	100	120	140	180	200
y	0.45	0.55	0.6	0.8	0.85

Find the law of the form y = a + bP using the method of least squares.

	b)	Solve the Lagrange's partial differential equation $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$	6	3	3	1
	c)	Classify the p.d.e. $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$. Using the method of separation of variables find the solution of $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ for all possible values of the parameter.	6	2	3	1
3	a)	Eliminate a, b and c from $z = a(x + y) + b(x - y) + abt + c$ to form a first order partial differential equation.	5	4	3	1
	b)	Evaluate $\int_C \frac{z}{(z-1)(z-2)^2} dz$ where $C: \lvert z - 2 \rvert = \frac{1}{2}$ using Cauchy's Residue theorem.	6	3	2	1
	c)	Form the partial differential equation by eliminating arbitrary functions from $z = xf_1(x + y) + f_2(x + y)$.	6	4	3	1

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