Q	Empirical Models can be used for?	M		1
A	System which are simple		0	1
A	System which is understood		0	2
A	System which are highly complex		1	3
A	System have one independent variable		0	4
Q	Theoretical Modelling is based on?	M		1
A	Chemistry & Physics of Process		1	1
A	Experiments data		0	2
A	Rigorous data		0	3
A	Simulation		0	4
Q	Empirical Modelling is basically derived using?	M		1
A	Conservation Equations		0	1
A	Experimental data		1	2
A	Chemistry & Physics of Process		0	3
A	Simulation		0	4
Q	For Complex model which modelling technique is not mostly preferred?	M		1
A	Empirical Modelling		0	1
A	Theoretical Modelling		1	2
A	Variable Modelling		0	3
A	Parameter Modelling		0	4
Q	Parameter estimation on model development using regression is based on?	M		1
A	Maximisation of difference between model predictions and data.		0	1
A	Model predictions are varying exponential as data calculated.		0	2
A	Minimisation of difference between model predictions and data.		1	3
A	Model predictions are square of the data.		0	4
Q	Equation of motion is	M		1
A	Conservation of mass		0	1
A	Conservation of energy		0	2
A	Conservation of momentum		1	3

A	Component continuity equation			0	4
Q	The model equation describe chemical kinetics		M		1
A	Law of mass action			1	1
A	Raoult’s law			0	2
A	Daltons’s law			0	3
A	Phase equilibrium relations			0	4
Q	Which model follows the changes over time that results from the system activities		M		1
A	Dynamic model			1	1
A	Static model			0	2
A	Analytical model			0	3
A	Numerical model			0	4
Q	Mathematical models are based on		M		1
A	Analogy between such systems are mechanical and electrical			0	1
A	Mathematical equations to represent the system			1	2
A	Analysis			0	3
A	Numerical methods			0	4
Q	Which model based on physical and chemical laws, thermodynamics, chemical reaction, kinetics are frequently employed in optimization application		M		1
A	Process model			0	1
A	Mathematical model			1	2
A	Empirical model			0	3
A	Linear model			0	4
Q	Which model can be devised to correlate input output data without any physiochemical analysis of the process		M		1
A	Linear model			0	1
A	Process model			0	2
A	Mathematical model			0	3
A	Empirical model			1	4
Q	Which type of mathematical model takes into account detailed variations in behavior from point to point throughout the system?		M		1
A	Distributed parameter model			1	1

A	Lumped parameter model		0	2
A	Steady state model		0	3
A	Unsteady state model		0	4
Q	The process of proving that a mathematical model describes the real world situation is	M		1
A	Tearing		0	1
A	Optimization		0	2
A	Verification		1	3
A	Initialization		0	4
Q	In a perfectly insulated well stirred tank a hot liquid stream at 60 deg C is mixed with a cold stream at 10 deg C .The well mixed assumption means that the fluid temperature in the tank is uniform and equal to the temperature at the exit from tanl.	M		1
A	Distributed		0	1
A	Lumped		1	2
A	Unsteady state		0	3
A	Non Linear		0	4
Q	What is a Process Model?	M		1
A	It is a set of equations that allows us to predict the behavior of a chemical process		1	1
A	It describes processes in flow diagrams where unit operations are positioned and connected by product streams		0	2
A	It is number of independent variables whose value must be assigned to obtain the values of other variables and to completely define the system.		0	3
A	It is the discipline of adjusting a process so as to optimize some specified set of parameters without violating some constraint		0	4
Q	. Antoine model is applicable for which of the following cases?	M		1
A	High Pressure System		0	1
A	Low Pressure System that behaves ideally		1	2
A	High Pressure System that behaves ideally		0	3
A	Low Pressure System		0	4
Q	For a system to be exactly specified	M		1

A	No of equations=no of unknown variables			1	1
A	No of equations< no of unknown variables			0	2
A	No of equations > no of unknown variables			0	3
A	No of equations < no of all variable present			0	4
Q	For a CSTR with cooling jacket, the model used with breakup of the jacket volume into number of perfectly mixed lumps is_______________		M		1
A	Plug flow cooling jacket			0	1
A	Lumped jacket model			1	2
A	Perfectly mixed cooling jacket			0	3
A	Isothermal CSTR model			0	4
Q	For a CSTR with perfectly mixed cooling jacket with temp Tj. The temperature inside the reactor is T. U is overall heat transfer coefficient and A is area of heat transfer. What is the model equation to find heat transfer rate		M		
A	$Q=UA(T_j-T)$			0	
A	$Q=UA(T-T_j)$			1	
A	$Q=UA(T+T_j)$			0	
A	$Q=UA/(T-T_j$			0	
Q	According to phase rule, Degree of freedom analysis is done by		M		
A	F = C - P			0	
A	F = C - P + 1			0	
A	F = C - P + 2			1	
A	F = P - C + 1			0	
Q	For “n” component flash operation Degree of freedom is		M		
A	0			0	
A	1			0	
A	2			1	
A	3			0	
Q	Recovery of a component in multi-component flash is defined as a ratio of:		M		
A	Amount of component in Liquid phase to that in Gas phase			0	
A	Amount of component in Gas phase to that in Feed			1	
A	Amount of component in Gas phase to that in Liquid phase			0	

A	Amount of component in Liquid phase to that in Feed			0
Q	For multi-component flash system, ratio of relative volatility to average relative		M	
A	P_k^0 / P			1
A	P_n^0 / P			0
A	P / P_k^0			0
A	P_k^0 / P_n^0			0
Q	For a system of isothermal CSTR in series having a compressible fluid and constant hold-up, which of the following variable is not a function of time		M	
A	Flow-rate			0
A	Volume of tank			1
A	Concentration			0
A	Density			0
Q	For a system of isothermal CSTR in series with constant hold-up having a reaction, which of the following is not a forcing function:		M	
A	Concentration of un-reacted A leaving first tank			1
A	Feed flow rate			0
A	Concentration of reactant A in the feed			0
A	Concentration of B in the feed			0
Q	In comparison to 3 isothermal CSTR in series with constant holdup, which fundamental equation is needed to solve a system of 3 isothermal CSTR in series with		M	
A	Energy equation			0
A	Component continuity equation			0
A	Equation of state			0
A	Continuity equation			1
Q	Which equation is used to solve multi-component flash systems?		M	
A	Ergun's Equation			0
A	Bernoulli's Equation			0
A	Rashford-Rice Equation			1
A	Gibbs-Duhem Equation			0
Q	For a mathematical model consisting of five equations to be solved there should be		M	

A	Parameters			0	
A	Forcing functions			0	
A	Independent variables			0	
A	Dependent variables			1	
Q	In thermal equilibrium model for LPG vaporizer		M		
A	Vapour and liquid temperatures are equal			1	
A	Vapour temperature is higher than liquid temperature			0	
A	Liquid temperature is higher than vapour temperature			0	
A	The temperature is always below -100^{0}C			0	
Q	In models where mass transfer effects have to be considered, the units of mass		M		
A	Area per time			0	
A	Length per time			1	
A	Volume per time			0	
A	Velocity per time			0	
Q	. In ________ problem of heat exchanger, size and configuration is known but heat		M		
A	design			0	
A	synthesis			0	
A	rating			1	
A	construction			0	
Q	In ________ problem of heat exchanger, heat duty is known but area is unknown.		M		
A	design			1	
A	synthesis			0	
A	rating			0	
A	construction			0	
Q	In stream tearing if row k dominates row l then :		M		1
A	Add row l			0	1
A	Add row k			0	2

A	Delete row l			0	3
A	Delete row k			1	4
Q	In stream tearing if column k dominates column j then :		M		1
A	Delete column j			1	1
A	Delete column k			0	2
A	Add column j			0	3
A	Add column k			0	4
Q	In flowsheet partitioning, groups of units which must be solved together are called		M		1
A	reducible			0	1
A	irreducible			1	2
A	irrelevant			0	3
A	redundant			0	4
Q	In Sequential Modular approach of simulation, _______ is required because of loops of information created by recycle streams.		M		1
A	partitioning			0	1
A	precedence ordering			0	2
A	tearing			1	3
A	mixing			0	4
Q	In Equation-Oriented approach of simulation, ___________ for the set of unknown variables is very important.		M		1
A	initialization			1	1
A	normalization			0	2
A	minimization			0	3
A	maximization			0	4
Q	Precedence ordering is used to partition the set of equations into a sequence of smaller sets of _________ equations		M		1
A	reducible			0	1
A	redundant			0	2
A	irrelevant			0	3
A	irreducible			1	4
Q	___________ represents some aspects of the real world by numbers or symbols.		M		1

A	Process simulation			1	1
A	Process control			0	2
A	Optimization			0	3
A	Process intensification			0	4
Q	Which algorithm is used to find the partitions and precedence ordering in a flow		M		1
A	Newton method algorithm			0	1
A	Armijo line search			0	2
A	Sargent and Westerberg algorithm			1	3
A	Broyden method algorithm			0	4
Q	BTA method is used for :		M		1
A	Determination of partitions in flow sheets			0	1
A	Determination of tear streams in flow sheets			1	2
A	Determination of modules in flow sheets			0	3
A	Determination of precedence ordering in flow sheets			0	4
Q	In Equation-Oriented approach of simulation storage requirement is :		M		1
A	Very low			0	1
A	Low			0	2
A	Zero			0	3
A	High			1	4
Q	The identification of recycle loops and methodical separation of the flowsheet into groups of process units required to be solved collectively is known as		M		1
A	Partitioning			1	1
A	Tearing			0	2
A	Topology			0	3
A	Ordering			0	4
Q	__________ is the first step for solving the material balance of a flow sheet.		M		1
A	Recycling			0	1
A	Tearing			0	2
A	Partitioning			1	3
A	Precedence ordering			0	4

Q	In direct substitution method, the necessary and sufficient condition for convergence is that the maximum eigen value should be :		M		1
A	Greater than 1			0	1
A	Less than 1			1	2
A	Less than 0			0	3
A	Equal to 1			0	4
Q	Wegstein method is used for :		M		1
A	Numerical integration			0	1
A	Solution of linear algebraic equations			0	2
A	Solution of non-linear algebraic equations			1	3
A	Solution of ordinary differential equations			0	4
Q	The steepest descent method has a __________ rate of convergence :		M		1
A	linear			1	1
A	quadratic			0	2
A	cubic			0	3
A	logarithmic			0	4
Q	In Levenberg-Marquardt method if λ =0 then the method reduces to the:		M		1
A	Secant method			0	1
A	Steepest descent method			0	2
A	Direct substitution method			0	3
A	Newton’s method			1	4
Q	The search direction p^k in Newton’s method is given by the equation :		M		1
A	$p^k = -(J^k)^{-1}f(x^k)$			1	1
A	$p^k = +(J^k)^{-1}f(x^k)$			0	2
A	$p^k = -(J^k)^T f(x^k)$			0	3
A	$p^k = +(J^k)^T f(x^k)$			0	4
Q	If the starting point is poor then which of the following is used with Newton’s method to solve nonlinear algebraic equations?		M		
A	Trapezoidal rule			0	
A	Cramer’s rule			0	

A	Armijo line search		1
A	Runge-Kutta method		0
Q	Which of the following is not used to solve nonlinear algebraic equations?	M	
A	Secant method		0
A	Bisection method		0
A	Successive substitution method		0
A	Cramer’s rule		1
Q	In direct substitution method the speed of convergence will be highest when the	M	
A	0.99		0
A	0.5		0
A	Close to zero		1
A	0.75		0
Q	In Levenberg-Marquardt method, the value of the parameter that adjusts the direction and length of the step is :	M	
A	-0.25		0
A	-0.5		0
A	-1		0
A	Non-negative		1
Q	The search direction in Newton’s method for solving nonlinear algebraic equations	M	
A	Hessian matrix		0
A	Inverse of Hessian matrix		0
A	Inverse of Jacobian matrix		1
A	Transpose of Hessian matrix		0
Q	In Newton’s method for solving non-linear algebraic equations the rate of	M	
A	Linear		0
A	Very Slow		0
A	Slow		0
A	Fast (Quadratic)		1
Q	Which of the following statements is true for Secant method?	M	
A	It has quadratic rate of convergence		0
A	It can be used to solve nonlinear algebraic equations		1

A	It cannot be used to solve nonlinear algebraic equations			0
A	It is used for numerical integration			0
Q	Which method for solving nonlinear algebraic equations requires calculation of		M	
A	Direct substitution method			0
A	Secant method			0
A	Bisection method			0
A	Newton's method			1
Q	Which of the following is NOT required for using Newton's method for		M	
A	The lower bound for search region.			1
A	Twice differentiable optimization function.			0
A	The function to be optimized.			0
A	A good initial estimate that is reasonably close to the optimal.			0
Q	Which of the following statements is INCORRECT?		M	
A	if the second derivative at x_i is negative, then x_i is a maximum.			0
A	If the first derivative at x_i is zero, then x_i is an optimum.			0
A	If x_i is a minimum, then the second derivative at x_i is positive			1
A	The value of the function can be positive or negative as any optima.			0
Q	For what value of x, is the function x^2-2x-6 minimized?		M	
A	0			0
A	1			1
A	5			0
A	3			0
Q	The Newton Raphson Method fails when?		M	
A	Jacobian is singular			1
A	Derivative is finite			0
A	Jacobian is finite			0
A	Jacobian is skew symmetric			0
Q	The maxima can be located by using the condition?		M	

A	Second derivative positive			0	
A	First derivative negative			0	
A	Second Derivative negative			1	
A	First Derivative equals second derivative			0	
Q	The first order Kuhn Tucker should follow these necessary conditions for optimality?		M		
A	First derivative of Langarange polynomial should be zero			1	
A	First derivative of Langarange polynomial should be positive			0	
A	First derivative should be negative infinite			0	
A	First derivative should not exist			0	
Q	The first order Kuhn Tucker should follow these necessary conditions for optimality?		M		
A	The constraint multipliers should not be negative			1	
A	The constraint multipliers square should be positive			0	
A	The constraint multipliers should have negative finite value			0	
A	The constraint multipliers not depends on function			0	
Q	The Newton’s method is convergence in what order?		M		
A	Quadratic			1	
A	Linearly			0	
A	Exponential			0	
A	Half			0	
Q	In Quasi Newton Method the double derivative of the function is approximated by?		M		
A	Slope using first order derivative.			1	
A	Hessian matrix			0	
A	Jacobi Matrix			0	
A	Finite difference			0	
Q	In which method the search for optimal solution is located with help of vertices of		M		
A	Simplex Method			1	
A	Conjugate Search Method			0	
A	Newton Method			0	
A	Quasi Newton Method			0	
Q	Cubic Interpolation method comes under which method?		M		
A	Polynomial Approximation method			1	

A	Gradient Search Method		0
A	Random Search		0
A	Quasi Search		0
Q	The feasible region for the inequality constraints with respect to equality	M	
A	Increases		1
A	Decreases		0
A	Does not change		0
A	Slightly changes		0
Q	The degree of freedom for an optimization problem that has four design variables is,	M	
A	9		0
A	4		1
A	16		0
A	2		0
Q	While solving a linear graphically the area bounded by the constraints is called	M	
A	Feasible region		1
A	Infeasible region		0
A	Unbounded solution		0
A	Bounded Solution		0
Q	If f(x) is continuous at every point in region R then f(x) is said to be ----------	M	
A	Continuous		1
A	Discontinuous		0
A	Optimum		0
A	Continuously integrable		0
Q	Which of the following functions first derivatives are continuous at the break point	M	
A	Continuous		0
A	Discontinuous		0
A	Splines		1
A	Discrete		0
Q	If feasible region F is empty then the problem is	M	
A	Infeasible		1
A	Feasible		0

A	Bounded			0
A	Unbounded			0
Q	In Newtons method if f ' ' (x) à 0 then method converges-------		M	
A	Slowly			1
A	Faster			0
A	Moderately			0
A	fails			0
Q	The negative gradient of f(x) is the direction that maximizes the rate of change of f(x) in moving towards the -----.		M	
A	Minimum			1
A	Maximum			0
A	Zero			0
A	Local maximum			0
Q	Which of the following methods is used for optimization?		M	
A	Armijo Line Search			0
A	Gradient Method			1
A	Cramer's Rule			0
A	Direct Substitution Method			0
Q	Optimization problems that have nonlinear objective and/or constraint functions of the problem variables are referred to as :		M	
A	Nonlinear programs			1
A	Linear programs			0
A	Kuhn Tucker conditions			0
A	Lagrange multipliers			0
Q	In nonlinear programming problem, the constraints create a region for the variables x		M	
A	Invalid region			0
A	Forbidden region			0
A	Feasible region			1
A	Boundary region			0