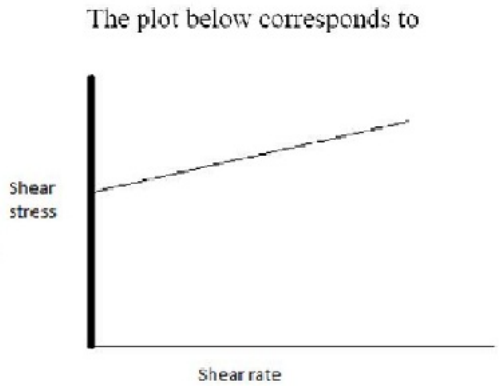
Subject Code : 603 Section Code : -Select- Difficulty: 1

Subject Code	Q Id	Questions	Answ Key
603	3601	Isotopes are atoms of (A) the same element with different masses (B) the same element with same masses (C) different element with same mass (D) different elements with different masses	(A)
603	3602	different elements with different masses (A) 44 grams (B) 88 grams (C) 176 grams (D) 132 grams	(C)
603	3603	In a test, 20kg of propane was burnt with 400 kg of air to produce 44kg of CO2 and 12 kg CO. What was the percent excess air? (A) 2.27 (B) 28 (C) 13.79 (D) 2.8	(B)
603	3604	One gram of a sample of crude sulfur is completely burnt in air. The weight of sulfur dioxide formed is 1.5 grams. The purity of sulfur sample is (A) 100% (B) 75% (C) 50% (D) 65%	(B)
603	3605	What is percentage carbon in ammonium carbonate, (NH4)2 CO3? (A) 12.50 (B) 6.25 (C) 25.0 (D) 12.0	(A)
603	3606	A cooking gas cylinder can withstand a pressure of 15 atm. The pressure gauge of the cylinder indicates 12 atm at 27�C.During a sudden fire in the building the temperature starts rising. At what temperature will the cylinder explode? (A) 33.75�C (B) 102�C (C) 40�C (D) 240 K	(B)
603	3607	Weight of 56 litres of ammonia at S.T.P. is _____ gram. (A) 2.5 (B) 8600 (C) 42.5 (D) 4. 56	(C)
603	3608		(C)

		A gas at 0°C is cooled at constant pressure until its volume becomes half the original volume. The temperature of the gas at this state will be (A) -273°C (B) - 136.5°K (C) -136.5°C (D) 0°K	
603	3609	„COX chart" is a plot of (A) Vapor pressure vs temperature (B) Log (vapor pressure) vas log (temperature) (C) Log (vapor pressure) vs temperature (D) Log (vapor pressure) vs inverse of temperature	(D)
603	3610	The vapor pressures of benzene and toluene are 3 and 4/3 atmospheres respectively. The vapor phase mole fraction of benzene in equilibrium with a liquid mixture of 0.4 moles of benzene and 0.6 moles of toluene is: (A) 0.8 (B) 0.6 (C) 0.2 (D) 0.4	(B)
603	3611	The critical point of a substance represents (A) a point (pressure and temperature) where all three phases of the substance coexist in equilibrium. (B) The lowest pressure and temperature where vapor and liquid phases coexist in equilibrium (C) A temperature where vapor is transformed into liquid (D) The highest pressure and temperature where all thermodynamic properties of the liquid and vapor are identical	(D)
603	3612	A gas can always be condensed by (A) cooling alone (B) compressing alone (C) cooling below the critical temperature and then compressing (D) bringing it below triple point	(C)
603	3613	Alkyl benzene sulfonate (ABS) is a (A) detergent (B) synthetic rubber (C) plasticizer (D) an industrial solvent	(A)
603	3614	Poly Tetra Fluro Ethylene (PTFE) is popularly known as (A) Perspex (B) Bakelite (C) pidilite (D) Teflon	(D)
603	3615	When small particles are settling in a fluid, at very low Reynolds numbers, the flow is described by (A) streamline flow (B) rotational flow (C) creeping flow	(C)

		(D) irrotational flow	
603	3616	A solid particle is moving through a fluid and the particle Reynolds number is 0.24; the drag coefficient is (A) 1 (B) 10 (C) 100 (D) 1000	(A)
603	3617	In fluid flow at low Reynolds numbers (A) viscous forces are important (B) Inertial forces are important (C) Buoyancy forces are important (D) Gravitational forces are important	(A)
603	3618	Two circular pipes have different diameters but same roughness. Water is flowing through pipe 1, having friction factor f1 at a Reynolds number of 12,000; air is flowing through pipe 2, having friction factor f2 at the same Reynolds of 12,000. Then (A) f1 > f2 (B) f2 < f1 (C) f1 = f2 (D) f1 and f2 cannot be calculated	(C)
603	3619	For standard steel pipes, for a given NPS, as schedule number increases, wall thickness (A) increases (B) decreases (C) remains same (D) schedule number has nothing to do with wall thickness	(A)
603	3620	The discharge is proportional to square root of the head for (A) orifice meter (B) V-notch (C) sutro-weir (D) rectangular notch	(A)
603	3621	The Fanning friction factor for turbulent flow is a where NRe is Reynolds number and E/D is relative roughness. (A) function of NRe only (B) function of E/D and Nre (C) function of E/D only (D) constant	(B)
603	3622	The hydraulic diameter of a duct having the shape of an equilateral triangle with side a is (A) $\sqrt{3}.a$ (B) $\sqrt{3}.a/4$ (C)	(C)

		$a/\sqrt{3}$ (D) $a/4\sqrt{3}$	
603	3623	When a material is subjected to an increased shear rate, an increase in its apparent viscosity occurs; such a phenomenon is observed in (A) dilatants (B) rheopectics (C) viscoelastics (D) thixotropics.	(A)
603	3624	Water is flowing under laminar conditions in a pipe of length L. If the diameter of the pipe is doubled, for a constant volumetric flow rate, the pressure drop across the pipe (A) decreases 2 times (B) decreases 16 times (C) increases 2 times (D) increases 16 times	(B)
603	3625	The plot below corresponds to  (A) Pseudo plastic fluid (B) real fluid (C) Bingham plastic (D) None of the above	(C)
603	3626	Diaphragm pumps are used to handle (A) highly viscous liquids (B) liquids to be pumped into high pressure vessels (C) hazardous or toxic liquids / slurries (D) liquids having very low vapor pressure	(A)
603	3627	The net positive suction head (NPSH) of a centrifugal pump is defined as the sum of the velocity head and the pressure head at th (A) suction (B) discharge minus vapor pressure of the liquid at the discharge temperature (C) discharge (D) suction minus vapor pressure of the liquid at suction temperature	(D)

603	3628	Froude number is a ratio of (A) inertial forces to gravity force (B) buoyant forces to gravity force (C) inertial forces to viscous forces (D) inertial forces to buoyant forces	(A)
603	3629	Cavitation in a centrifugal pump may be avoided by maintaining (A) a very low suction head (B) a positive suction head (C) a very low discharge head (D) the suction and discharge valves properly	(B)
603	3630	Bernoulli‟s theorem deals with the law of conservation of (A) energy (B) mass (C) momentum (D) gravity	(A)
603	3631	The loss of pressure head for the laminar flow through pipes varies as the (A) square of velocity (B) proportional to the velocity (C) inverse of the velocity (D) inverse of the square of the velocity	(B)
603	3632	For hydraulically smooth pipe, the resistance to flow depends only on the (A) flow Reynolds number (B) relative roughness (C) absolute roughness (D) Reynolds number and relative roughness	(A)
603	3633	The discharge co-efficient for a venturimeter is found to be a function of (A) meter size (B) Reynolds number (C) Both (A) and (B) (D) None of the above	(C)
603	3634	Newton‟s Law of viscosity states that the shear stress is directly proportional to the (A) velocity (B) velocity gradient (C) square of velocity (D) square of velocity gradient	(B)
603	3635	Vena contracta is found in (A) Rotameter (B) orificemeter (C) bourdon tube pressure gauge (D) wet gas flow meter	(B)

603	3636	The unit of kinematic viscosity is (A) m^2/s (B) Stoke (C) either (a) or (b) (D) poise	(C)
603	3637	Flow of incompressible fluid with no shear is called (A) creep flow (B) stream line flow (C) potential flow (D) boundary layer flow	(C)
603	3638	For precise control of fluid flow rate the best performance is obtained by (A) gate valve (B) check valve (C) globe valve (D) None of the above	(C)
603	3639	Compared to gate valve pressure drop is ---------- in globe valve. (A) less (B) more (C) same (D) unpredictable	(B)
603	3640	Turbulent velocity profile becomes flatter and flatter with ---------- (A) decreasing Reynolds number (B) increasing Reynolds number (C) at a given Reynolds number (D) None of the above	(B)
603	3641	In turbulent flow, mean velocity in a circular pipe is approximately equal to (A) 0.8 to 0.82 of maximum velocity (B) 0.9 to 0.95 of maximum velocity (C) 0.5 of maximum velocity (D) 0.6 to 0.65 of maximum velocity	(A)
603	3642	For closer sizing of solid particles, intermediate screens are available in Tyler standard screen series; the ratio of the actual mesh dimension of any screen in intermediate range to that of the next smaller screen is (A) 1.414 (B) 0.707 (C) 1.189 (D) 0.841	(A)
603	3643	Kynch theory is used in the design of (A) classifiers (B) centrifugal separators (C) filters (D) clarifiers	(D)

603	3644	For settling in the stokes range the value of Reynolds number is (A) 2 (B) 200 (C) 500 (D) 0	(D)
603	3645	LMTD correction factor is used in the design of (A) double pipe heat exchangers (B) shell and tube condensers (C) single pass shell and tube heat exchangers (D) multipass shell and tube heat exchangers	(D)
603	3646	Which has the lowest Prandtl number? (A) organic liquids (B) inorganic liquids (C) liquid metals (D) gases	(C)
603	3647	Heat exchangers which are especially useful with food products and similar heat- sensitive materials are (A) extended-surface exchangers (B) plate exchangers (C) scraped-surface exchangers (D) double-pipe exchangers	(C)
603	3648	The mode of heat transfer in microwave ovens used for baking food is (A) conduction (B) convection (C) radiation (D) combined convection and conduction	(C)
603	3649	The maximum heat loss from a heated pipe occurs when the thickness of thermal insulation is ---------- (A) less than critical radius (B) equal to critical radius (C) more than critical radius (D) both (b) and &#65533;	(B)
603	3650	In a cooling tower water is cooled from 95 &#65533; C to 80 &#65533; C by exposure to air with a wet bulb temperature of 70 &#65533; C.The approach would be (A) 15 &#65533; C (B) 10 &#65533; C (C) 25 &#65533; C (D) None of the above	(B)
603	3651	In a heat exchanger with steam outside the tubes, a liquid gets heated to 45&#65533;C, when its flow velocity in the tubes is 2 m/s. If the flow velocity is reduced to 1 m/s, other things remaining the same, the temperature of the exit liquid will be (A) equal to 45&#65533;C (B) initially decreases and remains constant thereafter (C) less than 45&#65533;C (D) more than 45&#65533;C	(D)

603	3652	Name the process in which heat transfer is undesirable and its flow is to be prevented (A) gas turbine blades (B) Wall of steam pipes (C) wall of internal combustion chamber (D) outer space vehicles	(B)
603	3653	Name the method by which heat transfer takes place due to direct molecular communication without any appreciable displacement of the system (A) forced convection (B) Natural convection (C) conduction (D) radiation	(C)
603	3654	The thermal conductivity of perfect heat insulator is (A) Zero (B) One (C) between 0 and infinity (D) infinity	(A)
603	3655	If the pipe radius (r) is less than critical radius (r_c), the heat loss from pipe (A) decreases with the addition of insulation until $r = r_c$ (B) increases with the addition of insulation until $r = r_c$ (C) increases with the addition of insulation (D) decreases with the addition of insulation	(B)
603	3656	All substances emit energy in the form of radiation continuously at a temperature of (A) above absolute zero temperature (B) above 0oC (C) above 100oC (D) above its decomposition temperature	(A)
603	3657	2-4 shell and tube heat exchanger means (A) 2 shell side pass and 4 tube side pass (B) 4 shell side pass and 2 tube side pass (C) 2 shell side pass and 2 tube side pass (D) 4 shell side pass and 4 tube side pass	(A)
603	3658	Mass dispersion may be characterized by the dimensionless group (A) Sherwood number (B) Peclet number (C) Fourier number (D) Froude number	(A)
603	3659	In general the diffusivity DAB in a liquid varies with temperature as (A) $T^{1.5}$ (B) T (C) 1/T	(B)

		(D) $T^{1.75}$	
603	3660	J flux is the molar flux with reference to (A) Moving frame of reference (B) Fixed frame of reference (C) None of the above (D) May be a) or b)	(A)
603	3661	The gas phase reaction $2A + B \leftrightarrow C + D$ occurs on the surface of a catalyst pellet at steady state. If the reaction is mass transfer controlled, then what is the flux ratio N_A/N_C? (A) -2 (B) -0.5 (C) 2 (D) 0.5	(A)
603	3662	Knudsen diffusion occurs when the ratio of pore diameter to mean free path of molecules is (A) less than 0.20 (B) greater than 0.20 (C) less than 2.0 (D) greater than 2.0	(A)
603	3663	For structure dependent diffusion in a solid the ratio of Effective diffusivity to Binary diffusivity (A) varies and depends on temperature (B) varies and depends on pressure (C) varies and depends on component diffusing (D) remains constant and depends on pore geometry	(D)
603	3664	For the boundary layer development on a flat plate during convective mass transport, the velocity profile will be identical to concentration profile, when Schmidt number is equal to (A) 0 (B) 1 (C) between 0 and 1 (D) more than 1	(B)
603	3665	Distillation can be used for the separation of components from a liquid mixture only if the operating temperature is (A) above the dew point temperature (B) below the bubble point temperature (C) between the bubble point and dew point temperature (D) All of the above	(C)
603	3666	In a binary mixture, separation is very efficient when the relative volatility is (A) 0 (B) 1 (C) between 0 and 1 (D) more than 1	(D)
603	3667	An azeotropic solution of two liquids has boiling point lower than either of them, when it	(C)

		(A) is unsaturated (B) is saturated (C) shows negative deviation from Raoult's law. (D) shows positive deviation from Raoult's law	
603	3668	If the feed to distillation column is a subcooled liquid , then q line is (A) Vertical (B) horizontal (C) line with a positive slope (D) line with a negative slope	(C)
603	3669	In a binary mixture ,separation is very efficient when the relative volatility is (A) 0 (B) 1 (C) more than 1 (D) between 0 and 1	(C)
603	3670	The feed to a distillation column is changed from saturated liquid to saturated vapour. If the separation and reflux ratio remains unchanged ,the number of ideal stages will (A) increase (B) decrease (C) remain constant (D) cannot say	(A)
603	3671	The washing of ammonia from a mixture of ammonia and air by means of liquid water is an example of (A) gas absorption (B) gas adsorption (C) gas desorption (D) gas stripping	(A)
603	3672	In case of a gas absorber (A) equilibrium curve lies below the operating line (B) equilibrium curve lies above the operating line (C) equilibrium curve lies above or below the operating line (D) None of the above	(A)
603	3673	In an azeotropic mixture the equilibrium liquid composition is (A) more than vapour composition (B) same as vapour composition (C) less than vapour composition (D) independent of pressure	(B)
603	3674	Down comer flooding occurs in plate columns at (A) low gas and liquid rates (B) high gas and low liquid rates (C) high gas and liquid rates (D) low gas and high liquid rates	(C)
603	3675	In the design and operation of packed towers the operating velocity is ---- percentage of flooding velocity	(A)

		(A) 70 and 85 (B) 85 and 95 (C) 50 and 60 (D) 60 and 65	
603	3676	In the design of towers used for mass transfer operations, the tower diameter is computed based on the considerations of (A) mass transfer (B) pressure drop (C) flooding (D) ratio of flow rates of phases	(C)
603	3677	Improved gas absorption can be achieved by carrying out the process at (A) low temperature and high pressure (B) high temperature and low pressure (C) high temperature and high pressure (D) low temperature and low pressure	(A)
603	3678	A column is designed to operate at a reflux ratio of 1.3 (saturated reflux).In actual operation the reflux is well below its bubble point. What reflux ratio would you suggest qualitatively? (A) R>1.3 (B) R<1.3 (C) 1.3 (D) R=0	(B)
603	3679	When a packed tower is operated close to flooding condition, we will have (A) more pressure drop and higher mass transfer (B) more pressure drop and lower mass transfer (C) lower pressure drop and higher mass transfer (D) lower pressure drop and lower mass transfer	(B)
603	3680	For distillation of heat sensitive materials (A) Atmospheric pressure is preferred (B) pressures above atmospheric pressure are preferred (C) vacuum conditions are preferred (D) pressure has no effect	(C)
603	3681	In a gas –liquid mass transfer operation if the gas side film mass transfer coefficient is much higher than the liquid side mass transfer coefficient, then the rate of mass transfer (A) is gas film controlled (B) is liquid film controlled (C) can be enhanced by increasing the turbulence in the gas phase (D) can be enhanced by decreasing the gas film thickness	(B)
603	3682	Freundlich isotherm relates (A) mass of solute adsorbed per unit mass of adsorbent with the concentration of solute in the liquid phase at equilibrium (B) Equilibrium compositions in gas and liquid phase (C) Liquid –liquid equilibrium relationship (D) None of the above	(A)

603	3683	For multistage cross-current adsorption operation, the stage operating lines lie (A) above the equilibrium curve with positive slopes (B) above the equilibrium curve with negative slopes (C) below the equilibrium curve with negative slopes (D) below the equilibrium curve with positive slopes	(C)
603	3684	Flash distillation is suitable for separation of components (A) which form an azeotrope (B) having very close boiling points (C) having very wide boiling points (D) one of which having a very high boiling point and other an impurity	(C)
603	3685	When a liquid is converted to vapour , entropy (A) Becomes zero (B) decreases (C) increases (D) remains the same	(C)
603	3686	The activity of ith species in a homogeneous solution (ai) can be defined as (A) $a_i = f_i f_i^0$ (B) $a_i = f_i / f_i^0$ (C) $a_i = f_i^0 / f_i$ (D) $a_i = \sqrt{f_i f_i^0}$	(B)
603	3687	A polytropic process PV^n = constant for which n is infinity is a (A) constant pressure process (B) constant volume process (C) constant temperature process (D) reversible adiabatic process	(B)
603	3688	Find the change in internal energy when 50 g of air is heated from 25 C to 27 C. The specific heat at constant volume is 0.184 cal/g/ C (A) 0.184 cal (B) 184 cal (C) 18.4cal (D) None of these	(C)
603	3689	An adiabatic system can exchange energy with its surroundings (A) only in the form of work (B) either in the form of heat or work (C) in the form only heat	(A)

		(D) both in the form of heat and work	
603	3690	For a reversible adiabatic change, the change in entropy of the system is (A) Zero (B) positive (C) negative (D) None of the above	(A)
603	3691	At 60° C, vapour pressure of methanol and water are 84.562 kPa and 19.953 kPa respectively. An aqueous solution of methanol at 60° C exerts a pressure of 39.223 kPa; the liquid phase and vapour phase mole fractions of methanol are 0.1686 and 0.5714 respectively. Activity co-efficient of methanol is (A) 1.572 (B) 1.9398 (C) 3.389 (D) 4.238	(A)
603	3692	In case of _____ process, the temperature of the system increases. (A) Adiabatic compression (B) isothermal compression (C) isothermal expansion (D) adiabatic expansion	(A)
603	3693	You turn off water flowing into the tube and open the drain. This is an example of (A) an open steady-state system (B) an open unsteady-state system (C) closed system (D) None of the above	(B)
603	3694	Which of the following is an extensive property? (A) Temperature (B) Pressure (C) Volume (D) Density	(C)
603	3695	Reactions which are very temperature – sensitive are the (A) reactions with high activation energies (B) reactions with low activation energies (C) reversible reactions (D) irreversible reactions	(B)
603	3696	Addition of inert gas in a reversible chemical reaction favors the forward reaction when (A) $\Delta n=0$ (B) $\Delta n>0$ (C) $\Delta n<0$ (D) Any of the above	(B)
603	3697	The ratio of volume of mixed reactor to the volume of P.F.R. (for identical flow rate, feed composition and conversion) for zero order reaction is (A) ∞	(C)

		(B) >1 (C) 1 (D) 0	
603	3698	When a zero-order reaction is carried out in a batch reactor, the time needed for the reactant concentration to become zero is where CAO is the initial concentration of reactant A and K is the reaction velocity constant. (A) $\frac{1}{K}$ (B) $\frac{C_{AO}}{2K}$ (C) $\frac{C_{AO}}{K}$ (D) $\frac{0.693}{K}$	(C)
603	3699	When the order of a reaction is greater than unity, as the initial concentration of reactant increases the half – life of the reaction (A) Remains same (B) decreases (C) increases (D) increases and then decreases	(B)
603	3700	Auto catalytic reactions occur with (A) the catalyst as one of the reactants (B) with one of the reaction products acting as a catalyst (C) temperature continuously increasing or decreasing (D) biocatalysts	(B)
603	3701	increases 1.414 times as the reactant concentration is doubled. What could be the order of reaction? (A) 0.5 (B) 1.0 (C) 1.5 (D) 2.0	(A)
603	3702	When a reversible reaction is carried out in the presence of a catalyst (A) The speed of forward reaction is increased and that of backward reaction is decreased. (B) The speed of forward reaction is increased to a larger extent than that of backward reaction. (C) The speed of backward reaction is increased and that of forward reaction is decreased. (D) The speeds of both forward and backward reactions are increased to the same extent.	(D)
603	3703	A zero-order reaction is carried out in an ideal PFR and MFR having equal volumes and operating under identical conditions. The ratio of conversions K1KCAO2KCAOK693.0 13 achieved in PFR to MFR will be (A) <1 (B) 1 (C) >1 (D) 2	(B)

603	3704	When complete back-mixing prevails in a flow vessel, the vessel dispersion number will be (A) zero (B) infinity (C) less than unity (D) greater than unity	(B)
603	3705	It is desirable to achieve maximum decomposition in the reaction $N_2O_4(g) \rightarrow 2NO_2(g)$: $\Delta H^\circ_{298} = 57.2$ KJ So, the reaction should be carried out at (A) high pressure and high temperature (B) low pressure and high temperature (C) high pressure and low temperature (D) low pressure and low temperature	(B)
603	3706	A pulse of tracer is injected into the inflow of a tubular flow system in which ideal plug flow prevails; the response appears at a time equals to where τ is the space time. (A) 0 (B) τ (C) $0.5\ \tau$ (D) $2\ \tau$	(B)
603	3707	When a reaction occurs between gas and liquid phases (reaction is very fast) and gas is sparingly soluble in liquid, it is likely that the global process is controlled by (A) mass transfer through gas film (B) mass transfer through liquid film (C) chemical reaction (D) mass transfer and chemical reaction	(B)
603	3708	For a porous catalyst particle “effectiveness factor” may be need as a measure to find whether the (A) catalyst formulation is good for a given reaction (B) reaction rate is lowered because of pore diffusional resistance (C) reaction is surface reaction – controlled (D) reaction is adsorption / desorption – controlled	(B)
603	3709	The problem of hot spots may occur in (A) trickle bed reactors (B) packed bed reactors (C) fluidized bed reactors (D) moving bed reactors	(B)
603	3710	The problem of “off-set” usually occurs with (A) derivative control (B) integral control (C) proportional control	(C)

		(D) PI control	
603	3711	An open tank is discharging water to the open atmosphere through a valve; the discharge (volumetric flow rate) is proportional to head available in the tank. The ratio of time constant of the system to hold up time is (A) 0.5 (B) 1.0 (C) 1.5 (D) 2.0	(B)
603	3712	For an under damped system, the damping coefficient is (A) zero (B) less than unity (C) unity (D) greater than unity	(B)
603	3713	A typical U-tube manometer filled with mercury or water would be (A) an under damped system (B) a over damped system (C) a critically damped system (D) a first-order system	(A)
603	3714	In the response of a first-order system to sinusoidal inputs, at higher frequencies the phase-lag approaches a limit of (A) -90^o (B) -45^o (C) -30^o (D) -60^o	(A)
603	3715	The resistance of a first order system is (A) driving force/ flow (B) storage/driving force (C) flow/ driving force (D) None of the above	(A)
603	3716	Time constant of mercury in glass thermometer (without covering or air gap) is equal to Where m is mass of mercury in tube C_p is the heat capacity of mercury, h is the film coefficient of heat transfer, A is the surface area of bulb for heat transfer. (A) $\frac{mC_p}{hA}$ (B) $\frac{hA}{mC_p}$ (C) mC_phA (D) $\frac{1}{mC_phA}$	(A)
603	3717	If two tanks each with time constant τ are connected in interacting manner , the transfer function relating the outlet flow (Q2) to	(C)

		the inlet flow (Q) to this two tank system is (A) $\frac{Q_2(s)}{Q(s)} = \frac{2}{\tau s+1}$ (B) $\frac{Q_2(s)}{Q(s)} = \left(\frac{1}{\tau s+1}\right)^2$ (C) $\frac{Q_2(s)}{Q(s)} = \frac{1}{\tau^2 s^2+3\tau s+1}$ (D) $\frac{Q_2(s)}{Q(s)} = \left(\frac{2}{\tau s^2+3\tau s+1}\right)^2$	
603	3718	The step input to a system with the transfer function $\frac{Y(s)}{X(s)} = \frac{1}{s^2+8s+4}$ gives a response which is (A) Under damped (B) oscillatory (C) over damped (D) critically damped	(C)
603	3719	A proportional controller is used to control temperature within the range of 60 to 100 °C. The controller is adjusted so that the output pressure goes from 3 kg/cm2(valve fully open) to 15 kg/cm2 (valve fully closed) as measured temperature goes from 71 to 75°C with the set point held constant. Now the value of gain and proportional band is (A) 3 kg/cm^2/ °C and 5% respectively (B) 3 kg/cm^2/ °C and 10% respectively (C) 5 kg/cm^2/ °C and 10% respectively (D) 10 kg/cm^2/ °C and 3% respectively	(B)
603	3720	At the corner frequency, the amplitude ratio for the sinusoidal response of a first order system is (A) $\frac{K}{\sqrt{2}}$ (B) $\sqrt{2}\ \mathrm{K}$ (C) $\sqrt{2K}$ (D) $\sqrt{\frac{K}{2}}$	(A)
603	3721	In a chemical reactor, following a change in the inlet concentration of the reactant outlet concentration tends to change. The outlet concentration of the reactant is to be controlled. This control problem is called as (A) Servo control (B) on-off control	(C)

		(C) regulator control (D) inherent control	
603	3722	Routh test for stability of control systems uses (A) open-loop transfer function (B) closed loop transfer function (C) characteristic equation (D) None of the above	(C)
603	3723	Iron sheets and pipes are usually galvanized for protection; the metal used in this process is (A) nickel (B) chromium (C) zinc (D) molybdenum	(C)
603	3724	Which one of the following heads is preferred for high pressure vessels? (A) Torispherical (B) Ellipsoidal (C) Hemispherical (D) Flat plate	(C)
603	3725	Skirt supports are particularly suitable for use with (A) long horizontal vessels (B) small vertical vessels (C) tall vertical vessels (D) short horizontal vessels	(C)
603	3726	The major constituent of natural gas is (A) methane (B) carbon dioxide (C) oxygen (D) nitrogen	(A)
603	3727	The fire of electrical equipments can be extinguished with the use of (A) soda-acid extinguisher (B) carbon dioxide extinguisher (C) foam extinguisher (D) antifreeze extinguisher	(B)
603	3728	Point velocity in a pipeline is measured by (A) Pitot tube (B) Pressure gauge (C) Venturi meter (D) Orifice meter	(A)
603	3729	Laplace Transform of $f(t)=e^{-3t}$ is (A) $1/(s+3)$	(A)

		(B) $1/(s-3)$ (C) $1/(s+3)^2$ (D) $1/(s^2+3)$	
603	3730	Write the following set of equations in a matrix form $40=5x_3+2x_1$ $10-x_2=x_3$ $3x_2+8x_1=20$ (A) $\begin{bmatrix}5 & 2 & 0\\ 0 & -1 & 1\\ 3 & 8 & 0\end{bmatrix}\quad\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}\quad=\begin{bmatrix}40\\ 10\\ 20\end{bmatrix}$ (B) $\begin{bmatrix}2 & 0 & 5\\ 0 & 1 & 1\\ 8 & 3 & 0\end{bmatrix}\quad\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}\quad=\begin{bmatrix}40\\ 10\\ 20\end{bmatrix}$ (C) $\begin{bmatrix}5 & 2\\ 1 & 1\\ 3 & 8\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}\quad=\begin{bmatrix}40\\ 10\\ 20\end{bmatrix}$ (D) $\begin{bmatrix}40 & 5 & 2\\ 10 & -1 & 1\\ 3 & 8 & 20\end{bmatrix}\quad\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}\quad=\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$	(B)
603	3731	The Newton Raphson method for finding the square root of a real number R in the equation $x^2-R=0$ (A) $x_{i+1}=\frac{x_i}{2}$ (B) $x_{i+1}=\frac{3x_i}{2}$ (C) $x_{i+1}=\frac{1}{2}\left(x_i+\frac{R}{x_i}\right)$	(C)

		(D) $x_{i+1} = \frac{1}{2}\left(3x_i - \frac{R}{x_i}\right)$	
603	3732	To solve the ordinary differential equation $3\left(\frac{dy}{dx}\right) + xy^2 = sinx\ ,\qquad y(0) = 5$ by Runge Kutta 4th order method , you need to rewrite the equation as (A) $\left(\frac{dy}{dx}\right) = sinx - xy^2\ , y(0) = 5$ (B) $\left(\frac{dy}{dx}\right) = \frac{1}{3}(sinx - xy^2)\ ,\ y(0) = 5$ (C) $\left(\frac{dy}{dx}\right) = \frac{1}{3}\left(-cosx - \frac{xy^3}{3}\right)\ ,\ y(0) = 5$ (D) $\left(\frac{dy}{dx}\right) = \frac{1}{3}sinx\ ,\ \ y(0) = 5$	(B)
603	3733	A partial differential equation has (A) one independent variable (B) two or more independent variables (C) more than one dependent variable (D) equal number of dependent and independent variables	(B)
603	3734	The partial differential equation $5\frac{\partial^2 z}{\partial x^2} + 6\frac{\partial^2 z}{\partial y^2} = xy$ is classified as (A) elliptic (B) parabolic (C) hyperbolic (D) None of the above	(A)
603	3735	Urea is produced from (A) Ammonia and CO_2 (B) N_2 and CO_2 (C) Methane and CO (D) Natural gas	(A)
603	3736	In Kraft pulping, fibrous material is cooked in the solution of (A) Sodium hydroxide and sodium carbonate (B) Sodium hydroxide and sodium sulphate	(B)

		(C) Sodium carbonate and sodium sulphate (D) None of the above	
603	3737	The equilibrium conversion of SO2 to SO3 in a reversible reaction can be increased by --------- (A) If some amount of SO3 is removed during intermediate stage (B) If some amount of SO3 is added during intermediate stage (C) By putting more amount of catalyst (D) None of the above	(A)
603	3738	Ammonia synthesis gas is produced from natural gas by (A) Partial oxidation (B) thermal cracking (C) hydrogenation (D) steam reforming	(D)
603	3739	10% Oleum means (A) 10kg SO_3 and 90 kg H_2SO_4 (B) 10kg H_2SO_4 and 90 kg SO_3 (C) 10kg SO_3 and 90 kg H_2SO_4 (D) 10kg H_2SO_4 and 90 kg SO_2	(A)
603	3740	The raw materials required in the manufacture of soda ash by Solvay Process are (A) Common salt, lime stone and coke (B) Glauber‟s salt,lime stone and coke (C) Common salt,sulphuric acid and lime stone (D) Glauber‟s salt, nitric acid and lime stone	(A)
603	3741	Nylon 6 is manufactured from (A) Caprolactum (B) w- amino undeconic acid (C) hexamethylene diamine and adipic acid (D) Phenol	(A)
603	3742	A dissolved solute is to be removed from a solution by stripping with a gas in a packed tower . The height of the packing (Raschig rings) is estimated to be h under a given set of temperature conditions. Which of the following changes in the operating conditions may be done in order to reduce the packing height without reducing the degree of separation.(i) Increasing the operating pressure (ii) decrease the operating temperature and rate of flow of stripping gas (iii) increase the temperature and decrease the pressure (iv) Use saddle packing rather than rings (v) increase the stripping gas rate (vi) add a suitable reagent to solvent that reacts with the dissolved solute (A) (i), (ii) (vi) (B) (ii) (C) (iii), (iv),(v) (D) (vi)	(C)
603	3743	Which of the following packings offer lowest pressure drop? (A) Plastic Raschig ring (B) Metal Pall ring (C) Ceramic intalox saddle (D) Plastic intalox saddle	(B)

603	3744	An orifice type liquid distributer in a packed bed has been installed. But it is tilted. Which of the following problems may occur as a result? (A) Blockage of gas flow through the bed (B) Flooding (C) channelling of liquid (D) All of the above	(C)
603	3745	For a given fluid as the pipe diameter increases, the pumping cost (A) increases (B) remains same (C) may increase or decrease depending upon whether the fluid is Newtonian or non- Newtonian (D) decreases	(D)
603	3746	In which of the electric power generation systems , the operating cost is the minimum? (A) Hydroelectric (B) Thermal (C) Nuclear (D) Fast breeder reactor	(A)
603	3747	Which one of the following is a wrong statement with respect to the distillation column? (A) Operating cost increases if reflux ratio increases (B) Large reflux ratio demands higher heat duty (C) As the reflux ratio increases , the number plates required decreases (D) As the reflux ratio increases condenser cooling load decreases	(D)
603	3748	The quantity of CO_2 in atmosphere is increased by (A) vegetation (B) green house effect (C) high winds (D) forests	(B)
603	3749	BOD and COD are the parameters used to assess the quality of (A) Waste water (B) drinking water (C) fertilizer (D) pesticides	(A)
603	3750	Activated sludge process utilizes ---------- for the treatment of wastewater (A) Activated carbon (B) sodium sulphite (C) Fenton reagent (D) microorganisms	(D)