PU M Tech Environmental Engineering and Mgmt

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152 PU_2015_393
Size of colloidal particles varies:-

- 10^{-9} - 10^{-12} m
- 10^{-3} - 10^{-9} m
- 10^{-6} - 10^{-9} m
- 10^{-12} - 10^{-19} m

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108 PU_2015_393
With a rise in temperature, the surface tension of a liquid:-

- Changes erratically
- Decreases
- Does not change
- Increases

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172 PU_2015_393
Conversion of $KMnO^4$ to $MnSO^4$ is a process of:-

- Reduction
- Dehydration
- Oxidation
- Both oxidation and reduction

4 of 100
205 PU_2015_393

In a triangle ABC, if $a = 4, b = 3, \angle A = 60°$, then c is the root of the equation

- $c^2 – 3c + 7 = 0$
- $c^2 + 3c + 7 = 0$
- $c^2 – 3c – 7 = 0$
- $c^2 + 3c – 7 = 0$

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141 PU_2015_393
Molarity of a solution relates the?

- Moles of the solute and solvent

- Volume of solute and the volume of solvent
- Moles of solute and mass of solvent
- Volume of solution and moles of solute

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121 PU_2015_393

A plate of area 10 cm^2 is separated from another plate by a 1 mm thick layer of glycerine. If the coefficient of viscosity is 20 poise then the force required to move the upper plate with a velocity of 1 cm/sec. over the lower one is:-

- 80 dyne
- 2000 dyne
- 200 dyne
- 800 dyne

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126 PU_2015_393

When light travels from an optically rarer medium to an optically denser medium, the velocity decreases because of change in:-

- Amplitude
- Phase
- Wavelength
- Frequency

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130 PU_2015_393

Woollen clothes keep the body warm, because:-

- wood rejects heat from the outer objects
- wool absorbs radiant heat from outer objects
- wool increases the temperature of the body
- wool is a bad conductor of heat, so it will not allow heat to flow out from the body

9 of 100

101 PU_2015_393

The number of grams in one pound is:-

- 546
- 226
- 526
- 453.6

10 of 100

142 PU_2015_393

Which of the following bond is most reactive?

- C ≡ C
- C – C
- C = C
- All

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166 PU_2015_393

Which of the following relates to light the wave as well as particle nature?

- Diffraction
- E = hv
- $E = mc^2$
- Interference

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137 PU_2015_393

A monochromatic visible light consist of:-

- A single ray of light
- Light of a single wavelength
- Light of a single wavelength with all the colours of the spectrum of white light
- Light consisting of many wavelengths with a single colour

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146 PU_2015_393

Which of the following is an emulsifier?

- NaCl
- Soap
- Oil
- Water

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155 PU_2015_393

In the solution of a gas in liquid the solubility?

- Increases with temperature
- Is unaffected by temperature
- Increases with decrease in pressure
- Increases with pressure

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115 PU_2015_393

Paraffin wax contracts on solidification. The melting point of wax will:-

- Not change with pressure
- Decrease linearly with pressure
- Decrease with pressure
- Increase with pressure

16 of 100

169 PU_2015_393

In the coagulation of positively charged colloidal solution which of the following has maximum coagulating power?

- $C1^{-}$
- $[Fe(CN)_6]^{4-}$
- PO^{3-}_4
- SO^{2-}_4

17 of 100

127 PU_2015_393

One of the devices to produce plane polarised light is:-

- a biprism
- a nicol prism
- a half-wave plate
- a crystal

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160 PU_2015_393

In decomposition reactions, enthalpy of products is always _____ than the enthalpy of reactants?

- Lesser
- Constant
- Infinite
- Greater

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140 PU_2015_393

A sensitive magnetic instrument can be shielded very effectively from outside fields by placing it inside a box of:-

- soft iron of high permeability
- teak wood
- plastic material
- a metal of high conductivity

20 of 100

195 PU_2015_393

Which of the following pairs of solutions can we expect to be isotonic at the same temperature?

- 0.1 M NaCl and 0.1 M Na_2SO_4
- 0.1M $Ca(NO_3)_2$ and 0.1 M Na_2SO_4
- 0.1 M urea and 0.2 M $MgCl_2$
- 0.1 M urea and 0.1 M NaCl

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143 PU_2015_393

Naturally occurring polymer is?

- PVC
- Polyethylene
- Proteins
- CH_3COOH

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117 PU_2015_393

Soap action is due to:-

- Colloidal dispersion of micelles in water
- Oil drop dispersal
- Micelle formation
- All of these

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189 PU_2015_393

How many grams of CH_3OH would have to be added to water to prepare 150 mL of solution that is 2.0 M CH_3OH?

- 9.6
- 4.3×10^2
- 2.4
- 9.6×10^3

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133 PU_2015_393

In an ordinary heater if the length of the coil is halved, then a given quantity of water will boil in:-

- same time
- cannot be compared because specific resistance of material of wire is not given
- less time
- more time

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107 PU_2015_393
The principle of the operation of a hydraulic press is based on:-

- Newton's law of gravitation
- Dalton's law of partial pressure
- Boyle's law
- Pascal's law

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136 PU_2015_393
A electric field can deflect:-

- Gamma rays
- X-rays
- α particles
- Neutrons

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203 PU_2015_393
If (x, 3) and (3, 5) are the extremities of a diameter of a circle with centre at (2, y), then the value of x and y are:-

- x=4, y=8
- x=1, y=4
- x=4, y=1
- x=8, y=2

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211 PU_2015_393

$$\int x^2 e^{2x}\, dx =$$

- $\frac{1}{2}e^{2x}\,[2x^2 - 2x + 1] + c$
- $e^{2x}\,[2x^2 - 2x + 1] + c$
- $\frac{1}{4}e^{2x}\,[2x^2 + 2x - 1] + c$
- $2x+c$

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162 PU_2015_393
The solvent which is neither proton donor nor proton acceptor is called?

- Aprotic
- Amphoteric
- Protonic
- Neutral

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122 PU_2015_393

A closed bottle containing water at 30°C is carried to the moon in a space ship. If it is placed on the surface of the moon, what will happen to the water as soon as the lid is opened?

- Nothing will happen to it
- The water will freeze
- It will decompose into H_2 and O
- The water will boil

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132 PU_2015_393

If electric field is uniform, then the electric lines of forces are:-

- circular
- convergent
- parallel
- divergent

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184 PU_2015_393

Electrophiles are:-

- Nucleus hating reagents
- Nucleus loving reagents
- Electron loving species
- Electron hating species

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147 PU_2015_393

Any substance which completely destroys or reduces the activity of the catalyst is called?

- Promoter
- Catalyst poison
- Catalyst
- Inhibitor

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102 PU_2015_393

The weight of a body at the centre of the earth is:-

- Same as on the surface of earth
- Infinite
- Indeterminate
- Zero

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171 PU_2015_393

The metal in a complex acts as:-

- Lewis base
- Catalyst
- Neutral compound
- Lewis acid

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159 PU_2015_393

Negative catalyst is that?

- Promotes the side reaction
- Retards the side reaction
- Which retards the rate of reaction
- Takes the reaction in backward direction

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150 PU_2015_393

The adsorption theory explains the action of all except:-

- Catalytic poisons
- Heterogeneous catalysis
- Acid-base catalysis
- Catalytic promoters

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199 PU_2015_393

The rate for the reaction RCl + NaOH(aq.) → ROH + NaCl is given by, Rate = k_1 [RC]. The rate of the reaction will be?

- Unaffected by increasing the temperature of the reaction
- Decreased on increasing the temperature of the reaction
- Doubled on doubling the concentration of NaOH
- Halved on reducing the concentration of RCl to one half

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207 PU_2015_393
Equation of normal to the curve y = x (2 – x) at the point (2, 0) is:-

- $x - 2y + 2 = 0$
- $2x + y = 4$
- $x = y = 2$
- $x - 2y = 2$

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104 PU_2015_393
Hair of shaving brush cling together when it is removed from water, due to:-

- Elasticity
- Surface tension
- Viscosity
- Friction

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105 PU_2015_393
A temperature degree on the Kelvin scale in same as:-

- Temperature on the Richter scale
- A temperature degree on the Fahrenheit scale
- Temperature degree on Reaumer scale
- Temperature degree on the Celsius scale

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213 PU_2015_393
A matrix is:-

- A collection of real or complex numbers
- An array of real numbers
- An array of real or complex numbers
- A collection of real numbers

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149 PU_2015_393
As a general rule, adding a catalyst to a reacting system:-

- Increases and decreases to yield irregularly
- Does not affect the yield of product
- Decreases the yield of the product
- Increase the yield of the product

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131 PU_2015_393
Which of the following is the unit of electric charge?

- ampere
- volt
- coulomb
- newton

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148 PU_2015_393
In the case of osmosis, solvent molecules move from?

- Higher concentration to lower concentration
- One region to another
- Higher vapour pressure to lower vapour pressure
- Lower vapour pressure to higher vapour pressure

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156 PU_2015_393
If a substance dissolves at saturation with the evolution of heat, the solubility?

- Decreases with increasing temperature
- Does not change with temperature
- Increases with increasing temperature
- Becomes exactly half

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113 PU_2015_393
Maximum possibility of turbulent flow is in a fluid of:-

- Low density and low viscosity
- High density and low viscosity
- Low density and high viscosity
- High density and high viscosity

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129 PU_2015_393
Pin hole camera is based upon:-

- Rectilinear propagation of light
- Corpuscular theory of light
- Refraction of light
- Wave theory of light

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180 PU_2015_393
A mixture of acetone and methanol can be separated by?

- Flash distillation
- Vacuum distillation
- Steam distillation
- Fractional distillation

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139 PU_2015_393
Susceptibility is positive and small for a:-

- paramagnetic substance
- diamagnetic substance
- non-magnetic substance
- ferromagnetic substance

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135 PU_2015_393
The infrared spectrum lies between:-

- radio wave and micro-wave region
- the visible and ultraviolet region
- the micro-wave and visible region
- the ultraviolet and the X-ray region

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134 PU_2015_393
According to classical theory the proposed circular path of an electron in Rutherford atom model will be:-

- circular
- spiral
- parabolic
- straight line

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124 PU_2015_393
Sunlight filtering through a tree often makes circular patches on the ground because:-

- The space through which light penetrates is round
- The sun is round
- Due to diffraction phenomenon
- Light is transmitted as wave motion

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144 PU_2015_393
In which of the following Bakelite, the phenol and formaldehyde plastic is not used?

- Combs and fountain pen
- Gramophone records
- Electrical fuses
- Paints

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153 PU_2015_393
Chemical equilibrium is dynamic in nature because:-

- The concentration of reactants and products become same at equilibrium
- The equilibrium is maintained rapidly
- The concentration of reactants and products are constant but different
- Both forward and backward reactions occur at all times with same speed

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119 PU_2015_393
Which one of the waves cannot be polarised?

- Sound waves
- Ultraviolet rays
- Radio waves
- X-rays

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128 PU_2015_393
Water evaporates under the atmospheric pressure. If now the same water is placed under vacuum, then the rate of evaporation:-

- Will double
- Will remain unchanged
- Will increase
- Will decrease

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138 PU_2015_393
A sample of an ideal gas occupies a volume ‘V’ at a pressure ‘P’ and absolute temperature ‘T’ the mass of each molecule is ‘m’. the expression for the density of gas is” (R: gas constant).

- Pm / RT
- m RT
- P / RT
- P / RTC

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157 PU_2015_393
Which of the following is not an intensive property?

- Mass
- Temperature
- Density
- Molarity

60 of 100
110 PU_2015_393
When a sealed glass vessel filled with water at 4°C is cooled, it breaks because:-

- of anomalous expansion
- of contraction of the glass
- both
- of expansion of the glass

61 of 100
225 PU_2015_393
A solution of pH 9.0 is one thousand times as basic as a solution of pH?

- 4
- 6
- 10
- 7

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237 PU_2015_393
Two equal drops of water are falling through the air with a terminal velocity of 10 cm/sec. If the drops coalesce, then the terminal velocity is:-

- 5 cm/sec
- 20 cm/sec
- $10(2)^{2/3}$ cm/sec
- 10 cm/sec

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235 PU_2015_393
10 gm of ice at -20°C is dropped into a calorimeter containing 10 gm of water at 10°C. The specific heat of water is twice that of ice. When equilibrium is reached, the calorimeter will contain:-

- 20 gm ice
- 20 gm water
- 5 gm ice and 15 gm water

- 10 gm ice and 10 gm water

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254 PU_2015_393

If in a ΔABC, $\sin A = \sin^2 B$ and $2\cos^2 A = 3\cos^2 B$, then the ΔABC is

- right angled
- obtuse angled
- equilateral
- isosceles

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223 PU_2015_393

Area bounded by the curve $y=x^3$, the x-axis and the ordinates x=-2 and x=1 is:-

- -9
- 17/4
- -15/4
- 15/4

66 of 100

221 PU_2015_393

If $a + b + c = 0$, the straight line $2ax + 3by + 4c = 0$ passes through the fixed point:-

- (2, 2)
- (4/3, 4/3)
- (2, 4/3)
- no such fixed point

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231 PU_2015_393

The total area of cross-section is 0.25 m^2. If blood is flowing at the rate of 100 cm^3/sec then the average velocity of flow of blood through the capillaries is:-

- 0.4 mm/s
- 4 mm/s
- 25 mm/s
- 400 mm/s

68 of 100

241 PU_2015_393

The acceleration of a particle at time t is given by $A = -a\omega^2 \sin \omega t$
Its displacement at time t is:

- $-a\omega^2 \sin \omega t$
- $a \sin \omega t$
- $(a\omega^2 \sin \omega t/2)$
- $a \cos \omega t$

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256 PU_2015_393
Water rises to a height of 10 cm when a glass tube is dipped vertically in it, what will be the rise if the tube is inclined at 30° to the vertical:-

- $\frac{\sqrt{3}}{10}$ cm
- 10 cm
- $\frac{5\sqrt{3}}{2}$
- $\frac{20}{\sqrt{3}}$

70 of 100

252 PU_2015_393
If $A + B + C = \pi$, then the value of tan A + tan B + tan C is given by:-

- 1
- cot A cot B cot C
- –1
- tan A tan B tan C

71 of 100

239 PU_2015_393
A dish of light material, partially filled with water, floating in a pan of water. A small stone, tied to string, is carefully lowered into the water in the dish such that it does not touch the sides or the bottom of the dish. Check the correct statement.

- The level of the dish sinks a little lower
- The level of the dish rises a little higher
- The dish sinks to the bottom of the pan
- The dish maintains its level in the pan

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227 PU_2015_393
The pH of a solution is 4. The $[H^+]$ ion concentration of the solution is?

- 0.4 moles/litre

- 4×10^4
- 10^{-4}
- 4 moles/litre

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233 PU_2015_393

Two thermometers, one Celsius and the other Fahrenheit are put in a hot bath. The reading on Fahrenheit thermometer is just three times the reading on Celsius thermometer. The temperature of the bath is:-

- 70°C
- 80°C
- 100°C
- 80/3°C

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248 PU_2015_393

A toy of mass M_1 is pulled along a horizontal frictionless surface by a rope of mass M_2. A force F is applied to the free end of the rope. The force exerted on the cart is:-

- $\frac{FM_1}{M_1+M_2}$
- F
- $\frac{FM_1}{M_1-M_2}$
- $\frac{FM_2}{M_1+M_2}$

75 of 100

246 PU_2015_393

When a 1 Newton force acts on a 1 kg body that is able to move freely, the body receives:-

- An acceleration of 1 m/sec^2
- A speed of 1 m/sec
- An acceleration of 1 cm/sec^2
- An acceleration of 980 cm/sec^2

76 of 100

229 PU_2015_393

The weight of 11.2 litres of CO_2 at S.T.P. would be?

- 32 gm
- 88 gm
- 44 gm

- 22 gm

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258 PU_2015_393

$\lim_{x \to 0} \frac{1-\cos x}{x^2}$ is equal to

- ½
- 1
- 0
- ¼

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250 PU_2015_393
Two satellites of masses m_1 and m_2 ($m_1 > m_2$) are revolving round the earth in circular orbits of radii r_1 and r_2 ($r_1 > r_2$) respectively. Which of the following statements is true regarding their speed v_1 and v_2?

- $v_1/r_1 = v_2/r_2$
- $v_1 < v_2$
- $v_1 > v_2$
- $v_1 = v_2$

79 of 100
245 PU_2015_393
The rate law for a reaction A + B → Product is rate = K $[A]^1$ $[B]^2$. Then, which one of the following statements is false?

- If [B] is held constant while [A] is doubled, the reaction will proceed twice as fast
- This is a third order reaction
- If [A] is held constant while [b] is reduced to one quarter, the rate will be halved
- If [A] and [B] are both doubled, the reaction will proceed 8 times as fast

80 of 100
243 PU_2015_393
In the following reaction, $4P + 3KOH + 3H_2O \rightarrow 3KH_2PO_2 + PH_3$

- Only P is reduced
- P is neither oxidised nor reduced
- Only P is oxidised
- P is oxidised as well as reduced

81 of 100
265 PU_2015_393

The complex number sin x + i cos 2x and cos x-i sin 2x are conjugate to each other for:-

- No value of x
- $x = (n + 1/2)\pi$
- $x = 0$
- $x = n\pi$

82 of 100
298 PU_2015_393

What is the percentage of ionization of 0.1 M Ch_3COOH, at 298 K ($K_\alpha = 1.8 \times 10^{-5}$)?

- 1.34
- 0.64
- 1.0
- 3.44

83 of 100
297 PU_2015_393

If x=log t+sin t, y=e^t+cos t, then $\frac{dy}{dx}$ =

- $\frac{t(e^t - \sin t)}{1 + t\cos t}$
- $\frac{1 + t\cos t}{t(e^t - \sin t)}$
- Sin t
- $\frac{t(1 + t\cos t)}{e^e \sin t}$

84 of 100
273 PU_2015_393

If $y = \sin(m \sin^{-1} x)$, then

- $(1 - x^2) y_2 - x y_1 - m^2 y = 0$
- $(1 - x^2) y_2 - x y_1 + m^2 y = 0$

- $(1-x^2)y_2 + xy_1 - m^2y = 0$
- $(1-x^2)y_2 - xy_1 - m^2y = 1$

85 of 100

263 PU_2015_393

A cube of size 10 cm is floating in equilibrium in a tank of water. When a mass of 10 gm is placed on the cube. The depth of cube inside water increases by:(g = 10 ms^{-2}, density of water = 10^3 kg m^{-3})

- 1 mm
- 0.1 m
- 0.1 mm
- 1 cm

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279 PU_2015_393

The positive values of a which satisfies

$$\int_0^a (3x^2 + 4x - 5)dx = a^3 - 2, \text{ are}$$

- 2, –1/2
- 2, 1/2
- 1,2
- 1, –2

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289 PU_2015_393

Let the vectors 2**i** + 3**j** - 4**k** and *a***i** + *b***j** + *c***k** be perpendicular. Then:-

- *a* = 4, *b* = 5, *c* = -4
- *a* = 4, *b* = 4, *c* = 5
- *a* = 2, *b* = 3, *c* = -4
- *a* = 4, *b* = 4, *c* = -5

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275 PU_2015_393

The area bounded by the normal at (1, 2) to the parabola $y^2=4x$, x-axis and the curve is given by:-

- 7/3
- 4/3
- 1/3

- 10/3

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295 PU_2015_393

Solution of the diff. eq^n. $\frac{dy}{dx}+\frac{3x+2y-5}{2x+3y-5}=0$ is

- (x+y)+3z = c
- $x^2+4xy-y^2-4x+6y = c$
- $(x+2y)^2+3y = c$
- $3x^2+4xy+3y^2-10x-10y = c$

90 of 100

287 PU_2015_393

The area of the triangle whose two sides are given by 4i – j + k and 4j + 2k is:-

- √ (14)
- 4√ (14)
- 2√ (14)
- 16√ (14)

91 of 100

291 PU_2015_393

The sum of 20 terms of the series 1 + 4 + 5 + 6 + 7 + ... is

- 248
- 247
- 249
- 250

92 of 100

281 PU_2015_393

Vectors 2**a**–**b**+**c**, 4**a**–7**b**–**c** and 3**a**+6**b**+6**c**; **a**, **b**, **c** are non-zero; non-coplanar; are:-

- both collinear and coplanar
- neither collinear nor coplanar
- coplanar
- collinear

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283 PU_2015_393

If **a** x **b** = **c**, **b** x **c** = **a**, then:-

- *c*=1, *a*=1
- *a*=1, *b*=*c*
- *b*=1, *c*=*a*
- *b*=2, *c*=2*a*

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285 PU_2015_393

The work done by the force **F** = 2**i** – 3**j** + 2**k** in moving a particle from (3, 4, 5) to (1, 2, 3) is:-

- -4
- 0
- 3/2
- -2

95 of 100

271 PU_2015_393

If $f(x) = (x - x_0)g(x)$ where $g(x)$ is continuous at x_0, then $f'(x_0)$ is equal to

- 1
- $g(x_0)$
- x_0
- 0

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293 PU_2015_393

The derivative of $\sin^{-1} x$ w.r.t $\cos^{-1} \sqrt{(1-x^2)}$ is:-

- 0
- $1/\sqrt{[(1-x^2)]}$
- $\cos^{-1} x$
- 1

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267 PU_2015_393

If $\sin\theta + \cos\theta = 1$, then the value of $\sin 2\theta$ is

- 0

- 3/4
- 1
- 1/2

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261 PU_2015_393

Equation of the diameter of the circle $x^2 + y^2 - 2x + 4y = 0$ which passes through the origin is:-

- $x - 2y = 0$
- $x + 2y = 0$
- $2x + y = 0$
- $2x - y = 0$

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269 PU_2015_393

If $u = f(y - z,\ z - x,\ x - y)$ then $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} =$

- 3
- $\frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} + \frac{\partial f}{\partial z}$
- 0
- 1/3

100 of 100

277 PU_2015_393

The area of the figure bounded by the curves $y = x + 1$ and $y = \cos x$ and x-axis is:-

- 1
- 0
- 1/3
- 2/3