Total No. of Questions – [04]

Total No. of Printed Pages: 03

G.R. No.	

PAPER CODE	U111 – 201 B

DECEMBER 2021 (INSEM+ ENDSEM) EXAM

F.Y. B. TECH. (SEMESTER - I)

COURSE NAME: CALCULUS

COURSE CODE: ES10201B

(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 **Solve the following**

i) If $f(x,y) = \sin(xy) + x^2\log(y)$ then $\frac{\partial^2 f}{\partial y \partial x}$ at $\left(0,\frac{\pi}{2}\right)$ is [2]

a) 33 b) 0 c) 3 d) 1

ii) If $u = x^3 \sin^{-1}\left(\frac{y}{x}\right) + x^2 y$ then value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ at (4,4) is [2]

a) 128 b) $64\left(\frac{\pi}{2}+1\right)$ c) $128\left(\frac{\pi}{2}+1\right)$ d) 64

iii) If $u = \tan^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \cdots$ [2]

a) $\frac{1}{2}\tan u$ b) $\sin 2u$ c) $\sin u \cos u$ d) $\frac{1}{4}\sin 2u$

iv) If $x = r\cos\theta$ and $y = r\sin\theta$ then $\left(\frac{\partial r}{\partial x}\right)^2 + \left(\frac{\partial r}{\partial y}\right)^2 = \cdots$ [2]

a) 0 b) 1 c) r d) r^2

v) If $f(x,y) = x^3 + y^3 - 3axy$ then $\frac{dy}{dx} = \cdots$ [2]

a) $3x^2 + 3ay$ b) $\frac{x^2+ay}{y^2-ax}$ c) $\frac{x^2-ay}{y^2+ax}$ d) $\frac{ay-x^2}{y^2-ax}$

vi) Minimum value of the function $x^2 + y^2 + 6x + 12$ is [2]

a) 0 b) 3 c) -3 d) 6

vii) If $x = r\cos\theta$ and $y = r\sin\theta$ then $\frac{\partial(r,\theta)}{\partial(x,y)}$ is [2]

a) 1 b) r c) $\frac{1}{r}$ d) 0

viii) Percentage error in calculating area of an ellipse having an error of 1% and 2% made in major and minor axis respectively is [2]

a) 1% b) 2% c) 3% d) -1%

ix) The function $x^2 + 4y^3 - 12y^2 - 36y + 2$ has at point $(0,-1)$ [2]

a) Maxima b) Minima c) Saddle point d) None of these

x) If $u = \frac{x+y}{1-xy}$ and $v = \tan^{-1}x + \tan^{-1}y$ then $\frac{\partial(u,v)}{\partial(x,y)}$ is [2]

a) 1 b) $\frac{1+y^2}{(1-xy)^2}$ c) $\frac{1+x^2}{(1-xy)^2}$ d) 0

xi) $\int_0^{2\pi} \sin^7 x\, dx = \cdots$ [2]

a) $\frac{32\pi}{35}$ b) $\frac{64}{35}$ c) $\frac{32}{35}$ d) 0

xii) $\int_0^{\infty} e^{-x}x^{5/2}\, dx = \cdots$ [2]

a) $\frac{15\sqrt{\pi}}{8}$ b) $\frac{3\sqrt{\pi}}{8}$ c) $\frac{3\sqrt{\pi}}{4}$ d) $\frac{3\sqrt{\pi}}{2}$

xiii) $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta = \cdots$ [2]

a) $\frac{\pi^2}{2}$ b) $\sqrt{\pi}$ c) $\frac{\pi}{\sqrt{2}}$ d) $\frac{\sqrt{\pi}}{2}$

xiv) The value of a_n in the Fourier series of $f(x) = x$ in the the interval $0 < x < 2\pi$ is [2]

a) $\frac{2}{n}$ b) $-\frac{2}{n}$ c) $\frac{1}{n}$ d) 0

xv) The value of a_0 in the Fourier series of $f(x) = x^2$ in the the interval $-\pi < x < \pi$ is [2]

a) $\frac{\pi^2}{3}$ b) $\frac{2\pi^2}{3}$ c) π^2 d) 0

Q.2 **Solve any two out of three**

a) Solve $\frac{2x}{y^3}dx + \left(\frac{y^3 - 3x^2}{y^4}\right)dy = 0$ [5]

b) Solve $(1 + y^2)dx = (\tan^{-1}y - x)dy$ [5]

c) Find an orthogonal trajectory of family of curves given by $r^2 = a \sin 2\theta$. [5]

Q.3 **Solve any two out of three.**

a) Trace the curve $y(x^2 - 1) = x^2 + 1$. [5]

b) Trace the curve $r^2 = a^2 \cos 2\theta$. [5]

c) Trace the curve $x^{2/3} + y^{2/3} = a^{2/3}$. [5]

Q.4 **Solve any two out of three.**

a) Evaluate $\int_0^1 \int_y^{1+y^2} x^2 y \, dxdy$. [5]

b) Evaluate $\int_0^1 \int_{y^2}^{1} \int_0^{1-x} x \, dzdxdy$. [5]

c) Find the area enclosed by the parabolas $x^2 = 4ay$ and $y^2 = 4ax$. [5]

Total No. of Questions – [3] Total No. of Printed Pages: 4

G.R. No.	22110262

PAPER CODE	0111 – 2021

DECEMBER 2021(INSEM+ ENDSEM) EXAM
F.Y. B. TECH. (SEMESTER - I)
COURSE NAME: PYTHON FOR ENGINEERS
COURSE CODE: CS10202B

(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 **Solve the following** **[30]**

i) Select the correct output of the following String operations. [2]

```
strOne = str("pynative")
strTwo = "pynative"
print(strOne == strTwo)
print(strOne is strTwo)
```

A.false false B.true true C.true false D.false true

ii)Choose the correct way to access value **20** from the following tuple [2]

```
aTuple = ("Orange", [10, 20, 30], (5, 15, 25))
```

A.aTuple(1:2)(1) B. aTuple[1:2](1) C. aTuple[1:2][1] D.aTuple[1][1]

iii)Which of the following will delete key_value pair for key="Monkey" in dictionary? [2]

```
dic={"zebra":"wild","Monkey":"wild","rabit":"domestic","duck":"domestic"}
```

A.del dic["Monkey "] B.dic["Monkey r"].delete()
C.delete(dic.[" Monkey "]) D.del(dic.[" Monkey "])

iv).What is the output of the following code [2]

```
aSet = {1, 'PYnative', ('abc', 'xyz'), True}
print(aSet)
```

A. {'PYnative', 1, ('abc', 'xyz'), True} B.TypeError
C. {'PYnative', 1, ('abc', 'xyz')} D.None

v). Select the correct output of the following String operations [2]

```
myString = "pynative"
stringList = ["abc", "pynative", "xyz"]
print(stringList[1] == myString)
print(stringList[1] is myString)
```

A.true false B.true true C. false, false D.false,true

vi) What is the output of the following? [2]

```
print("Hello {1} and {0}".format('bin', 'foo'))
```

A. Hello foo and bin
B. Hello bin and foo
C. Error
D. None of the mentioned

vii). What is the output of the following? [2]

```
s1={5,7,2}
s1.add(7)
print(s1)
```

A. {2,5,7}
B. {5,7,2,7}
C. Error as there is no add function in set data type
D. Error as 7 already exist in the set

viii) What is the output of the following? [2]

```
d1={1:"ABC",2:"XYZ",3:"PQR"}
d1.clear()
print(d1)
```

A. {}
B. None
C. {1:None,2:None,3:None}
D.Type Error

ix) What command is used to insert 6 in a list "L" at 3rd position ? [2]

A. L.insert(2,6)
B. L.insert(3,6)
C .L.add(3,6)
D. L.append(2,6)

x) What does the following code print to the console? [2]

```
hair_color = "blue"
if 3 > 2:
    if hair_color == "black":
      print("You rock!")
else:
   print("Boring")
```

A. blue
B. black
C. Boring
D. You rock

xi) What is the output of the following for loop and range() function [2]

```
for num in range(-2,-5,-1):
  print(num, end=", ")
```

A . -2, -1, -3, -4
B. -2, -1, 0, 1, 2, 3,
C. -2, -1, 0
D. -2, -3, -4,

xii) What will be the output of the following Python code? [2]

```
i=0
  while i<3:
    print(i)
    i +=1
  else:
    print(0)
```

A. 0 1 2 3 0
B. 0 1 2 0
C. 0 1 2
D. error

xiii) Select the correct output of the following String operations [2]

```
str = "my name is James bond";
print (str.capitalize())
```

A. My Name Is James Bond
B. TypeError: unsupported operand type(s) for * or pow(): 'str' and 'int'
C. My name is james bond

- D. none of these

xiv) What is the output of the following code [2]

```
str1 = "My salary is 7000";
str2 = "7000"
print(str1.isdigit())
print(str2.isdigit())
```

A. False True B. False False C. True False D.True True

xv) Suppose list1 is [4, 2, 2, 4, 5, 2, 1, 0], Which of the following is correct syntax for slicing operation? [2]

A. print(list1[0])
B. print(list1[:2])
C. print(list1[:-2])
D. all of the mentioned

Q2.Solve any three out of four

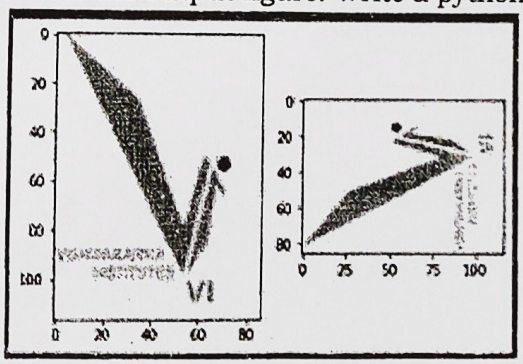
a) Describe broadcasting in NumPy, state different rules in broadcasting with example and code? [5]

b) Write a NumPy program to get the following expected output of an array values element-wise. [5]

arr1=[7,8,11]
arr2=[4,3,3]
Expected output
A = [2401 512 1331]
B= [3 2 2]

c) Differentiate between Python list and NumPy array? Write a code to create 1D,2D and 3D array [5]

d) Observe the output figure. Write a python code for obtaining this output. [5]



Q3.Solve any three out of four

a) Write a Python program to append text to a file and display the text [5]

Input file:

At the end of the day, whether or not those people are comfortable with how you're living your life doesn't matter. What matters is whether you're comfortable with it.

Append with following lines:

Life has got all those twists and turns. You've got to hold on tight and off you go.

b)Explain readline() and readlines() function. Write a python program to print the last two lines of a file [5]

Input file:

Nothing is impossible. The word itself says 'I'm possible!'
There is nothing impossible to they who will try.
Keep your face always toward the sunshine, and shadows will fall behind you.

c) Write the symbols and explain in detail the modes used in text file for the following operations. [5]

a) Read Only
b) Write only
c) Read and Write
d) Write and Read

What is the difference between write and append mode?

d) Write a python program to count 'the' and display the total number of lines from the file. [5]

Input file:

People tell you the world looks a certain way.
Parents tell you how to think. Schools tell you how to think.
TV. Religion. And then at a certain point, if you're lucky, you realize you can make up your own mind.
Nobody sets the rules but you. You can design your own life.

Total No. of Questions – [4] Total No. of Printed Pages: 03

G.R. No.	

PAPER CODE	U111-203B

DECEMBER 2021 (INSEM+ ENDSEM) EXAM

F.Y. B. TECH. (SEMESTER - I)

COURSE NAME: BASIC ELECTRONICS ENGINEERING

COURSE CODE: ET10203B

(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 • **Solve the following**

i) If the a.c. input to a half-wave rectifier is an r.m.s value of 400/√2 volts, then diode PIV rating is------- [2]

a) 400/√2 V b) 400 V
c) 400 √2 V d) 200 V

ii) Two LED's are connected in series along with limiting resistance. It is supplied with 10 V DC supply and drop across each LED is 2V, the value of limiting resistance for 20 mA current is----- [2]

a) 200 Ω b) 250 Ω
c) 300 Ω d) 400 Ω

iii) The internal quantum efficiency of LEDs decreasing _____with _____ temperature. [2]

a) Exponentially, decreasing b) Exponentially, increasing
c) Linearly, increasing d) Linearly, decreasing

iv) For single phase supply frequency of 50 Hz, ripple frequency in full wave rectifier is ---- [2]

a) 25 Hz b) 50 Hz
c) 100 Hz d) 200 Hz

v) Each diode in a center-tapped full-wave rectifier is _____ -biased and conducts for _____ of the input cycle. [2]

a) forward, 90 degrees b) forward, 180 degrees
c) reverse, 90 degrees d) reverse, 360 degrees

vi) What is the average value of half wave rectifier, for the Vp(out)= 50V [2]
a) 21.2 V b) 15 V
c) 15.9 V d) 19.9 V

vii) In Center tapped FWR, if the peak value of secondary voltage is 25 V then the peak value of the output voltage is ____ [2]
a) 24.3 V b) 11.8 V
c) 25.7 V d) 12.5 V

viii) The current flowing through the Photo diode without illumination of light in reverse bias mode is called as ---------- [2]
a) reverse current b) dark current
c) forward current d) pinch off current

ix) Determine value of collector current I_C, for β=150 and base current I_B= 430 µA. [2]
a) 100 mA b) 46.8 mA
c) 64.5 mA d) 80.3 mA

x) For voltage divider biasing circuit, if R_1=18 KΩ, R_2= 4.7 KΩ, V_{CC}=10V. What is the value of V_B (voltage at Base terminal)? [2]
a) 2.07 V b) 3.23 V
c) 10 V d) 5.1 V

xi) In Common Emitter amplifier, if base current is 10 mA and beta is 100. What is the value of collector current? [2]
a) 1 mA b) 1000 micro A
c) 1 A d) 10 nano A

xii) In voltage divider biasing circuit using BJT, if V_E=2.42 V and R_E=240Ω. What is the value of emitter current I_E? [2]
a) 10 mA b) 25 mA
c) 20 mA d) 100 mA

xiii) What is the total phase shift requirement, around the feedback loop, for a phase-shift oscillator? [2]
a) 90° b) 180°
c) 270° d) 360°

xiv) The biasing circuit has a stability factor of 24. If due to temperature change, I_{CBO} changes by 3 µA, then I_C will change by ..... [2]
a) 8 µA b) 7.2 µA
c) 0.72 µA d) 72 µA

xv) In transistor amplifier circuit, V_{CC} applied as 12 V. For maximum amplification of input signal at its output, what will be the value of V_{CE} required? [2]
a) 12 V b) 0.7 V
c) 6 V d) 1.2 V

Q2 **Solve any three out of four**

a) Sketch the internal construction of an n-channel Enhancement type MOSFET and explain the pinch off process? [5]

b) List the MOSFET amplifier configurations, and state two applications for each configuration. [5]

c) Calculate V_{GS} and V_{DS} for the MOSFET with voltage divider bias circuit, given parameters are $R_1 = 150\ K\Omega$, $R_2 = 20\ K\Omega$, $R_D = 200\ \Omega$, $V_{DD} = 24$ V. Assume this particular MOSFET has minimum values of $I_{D(on)} = 200$ mA at $V_{GS} = 4$ V and $V_{GS(th)} = 2$ V. [5]

d) Sketch the internal structure for TRIAC and draw its complete characteristics. [5]

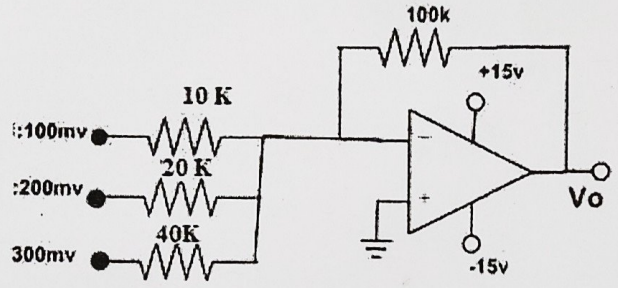
Q.3 **Solve any three out of four**

a) Write a short note on CMRR and Slew rate of an op-amp. [5]

b) Compare between Inverting and noninverting amplifier configurations of an op-amp [5]

c) Draw the diagram of non-inverting amplifier configuration using an op-amp and derive the expression of its gain. [5]

d) For the given circuit diagram, if 3 input voltages 100mv; 200mv and 300mv are applied at inverting terminal. Find the output voltage Vo. [5]



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Total No. of Questions – [3] Total No. of Printed Pages: 4

G.R. No.	

PAPER CODE	U111-204B

DECEMBER 2021 (INSEM+ ENDSEM) EXAM

F.Y. B. TECH. (SEMESTER - I)

COURSE NAME: ENGINEERING CHEMISTRY

COURSE CODE: ES10204B

(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 Solve the following

i) Which of the following statements are correct? **[2]**

i)Disinfection by chlorine is costlier than ozone.

ii) Chloramine is much more lasting than chlorine alone and consequently, it is a better bactericidal than chlorine alone.

iii) Bleaching powder introduces calcium in water, thereby making it more hard.

iv) Bleaching powder is stable and does not deteriorate on keeping.

a) i & ii
b) iii & iv
c) i & iii
d) ii & iii

ii) An exhausted Zeolite softener was regenerated by passing 80 litres of NaCl solution having strength of 6% NaCl. Calculate the $CaCO_3$ equivalent hardness retained on zeolite bed which was replaced by NaCl solution. **[2]**

a) 410.256 mg
b) 410.256 gm
c) 4102.56 mg
d) 4102.56 gm

iii) 50 ml of standard hard water containing 1 mg/ml $CaCO_3$ when titrated against EDTA using EBT indicator required 20 ml EDTA for the end point. Hence 1 ml of EDTA solution reacts with _____of $CaCO_3$ hardness. **[2]**

a) 25 mg
b) 2.5 mg
c) 250 mg
d) 0.25 mg

iv) Match the following **[2]**

P	Zeolite softener	I	Regenerated by dil HCl
Q	Cation Exchanger	II	Desalination of water
R	Anion Exchanger	III	Regenerated by NaCl solution
S	Electrodialysis	IV	Regenerated by dil NaOH

a) P-I, Q-II, R-III, S-IV
b) P- II, Q-III, R – IV, S-I
c) P- III, Q-I, R-IV, S-II
d) P-II, Q-III, R – I, S-IV

v) A sample of hard water has a hardness of 510 mg/L. Convert this hardness in degree French, degree Clarke and ppm respectively. **[2]**
a) 35.7, 510 and 51
b) 510, 35.7 and 51
c) 255, 71 and 153
d) 51, 35.7 and 510

vi) A sample of hard water contains following dissolved salts per liter. **[2]**
$Mg(HCO_3)_2$= 73 mgs, $CaCl_2$= 222 mgs, $MgSO_4$= 60 mgs, $Ca(NO_3)_2$= 328 mgs, NaCl = 58.5 mgs. Calculate permanent hardness of water in degree French. (Atomic weight Ca=40, Mg=24, S= 32, Cl=35.5, O=16, N = 14, C=12, Na=23 and H=1).

a) 450 °Fr
b) 31.5 °Fr
c) 45 °Fr
d) 315 °Fr

vii) An exhausted zeolite was regenerated by 300 litre of NaCl having strength 210 gm/litre. How many litres of a hard water having hardness 350 ppm as $CaCO_3$ can be soften by this softener? **[2]**
a) 159915.71 liters
b) 153846.15 liters
c) 151735.36 liters
d) 155915.71 liters

viii) An exhausted Zeolite softener was regenerated by passing 150 litres of NaCl solution having strength of 150 g/litre of NaCl. If the hardness of water sample is 600 ppm, calculate total volume of water that can be softened by this softener. **[2]**
a) 32051.28 liters
b) 22500.00 liters
c) 19230.76 liters
d) 32122.90 liters

ix) Which of the following is responsible for high strength in cement? **[2]**
(i) C_2S (ii) C_3S (iii) C_3A (iv) C_4AF
a) (i) and (ii)
b) (ii) and (iii)
c) (iii) and (iv)
d) (i) and (iii)

x) According to ISI specifications of Portland cement, weight of magnesia should not exceed____ and insoluble residue should not exceed _____ **[2]**

respectively

a) 2% and 6%

b) 6% and 2%

c) 6% and 4%

d) 4% and 2%

xi) Structural requirement for intrinsic conducting polymers are _____ and _____. [2]

a) Polymers are highly crystalline and has high planarity

b) Polymers are less crystalline and has high planarity

c) Polymers are highly crystalline and has low planarity

d) Polymers are less crystalline and has low planarity

xii) _____ is used for thermal insulation in construction industry and _____is used for core of Polymer optical fibers respectively [2]

a) Polyethylene and Polyurethane

b) Expanded Polystyrene and Polymethyl Methacrylate

c) PPV and Nylon 6,6

d) Polycarbonate and Nylon 6,6

xiii) Optical fibers are having components in following order. (Select appropriate order) [2]

a) Core, Cladding, Buffer, Jacket

b) Cladding, Buffer, Core , Jacket

c) Cladding, Core, Jacket, Buffer

d) Jacket, Buffer, Core, Cladding

xiv) Which of the following is not applicable for liquid crystal display [2]

(i) It is an electronic display device that operates by applying a varying electric voltage to a layer of liquid crystal

(ii) LCDs are commonly used for portable electronic games

(iii) Liquid crystal display screen works on the principle of emitting light.

(iv) It uses nematic liquid crystals

(v) It uses ITO as anode and Aluminium as cathode

a) (i) and (iii)

b) (iii) and (iv)

c) (iii) and (v)

d) (ii) and (iv)

xv) In Primary Lithium battery, _____is used as cathode and _____is used as electrolyte respectively. [2]

a) Wet paste of Manganese dioxide and Lithium salts dissolved in aqueous inorganic solvent

b) Wet paste of Manganese dioxide and KOH dissolved in organic solvent

c) Heat treated Manganese dioxide and Lithium salts dissolved in aqueous organic solvent

d) Heat treated Manganese dioxide and Lithium salts dissolved in non-aqueous organic solvent

Q.2 Solve any three out of four

a) 1) Explain: [5]

i) Acetamide absorbs at 1660 cm^{-1} whereas benzaldehyde absorbs at 1745 cm^{-1}

ii) Ethylene shows absorption at λmax = 171 nm but butadiene shows absorption at λmax=217 nm

2) Write forbidden electronic transitions in UV Visible region.

b) Predict and draw graphs in the following conductometric titration and show equivalence point of titration. Explain the nature of graph before and after equivalence point [5]
i) CH_3COOH vs NaOH (NaOH taken in burette)
ii) HCl vs NH_4OH (NH_4OH taken in burette)

c) 1) What are the possible electronic transitions in the following molecules when they are exposed to UV-Visible radiations? [5]
i) CH_3-CH_2-COOH
ii) CH_3COCH_3
iii) CH_3-CH_2-CH_2-CH_2-CH_3
2) Why the absorption band at 280 nm in aniline is disappeared upon addition of hydrochloric acid?

d) Calculate possible number of fundamental vibrations in CO_2, CH_4, H_2O, C_2H_6 & NH_3 [5]

Q.3 Solve any three out of four

a) Identify types of oxide films formed on the surface of following metals (i) Na (ii) Al (iii) Ag (iv) Mo (iv) Cu. Explain with oxidation reactions. [5]

b) What are the types of metallic coatings? Which is preferred coating? Why? Identify type of coating involved in following examples. [5]
i) Coating of zinc on iron
ii) Coating of tin on iron

c) **Give reason:** [5]
i) If the ratio of cathodic area to anodic area is greater, then the rate of wet corrosion is faster.
ii) Smaller the grain size of the metal or alloy, greater is the rate of corrosion
iii) The rate of atmospheric or dry corrosion is faster at higher temperature
iv) The corrosion of metal is fast in humid atmosphere than in dry atmosphere
v) The rate of corrosion is faster due to active impurity present in metal

d) Identify the most appropriate and economical corrosion protection method for following examples. [5]
i) ornaments, wrist watches, belts, pens
ii) nuts, bolts, screws, spanners & screw drivers
iii) containers used for storing foods, ghee, oils, pickles, medicines
iv) Chemical reactors, Industrial water coolers, Pipe lines for carrying corrosive liquids or solutions etc.
v) Buried steel pipelines, Ship hull, Buried cables