

483 PU P G Diploma Green Energy Technology

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If $y = 5x^2 + 3$, then the tangent at $x=0$, $y=3$

- Passes through x equals 0, y equals 0
- has a slope +1
- is parallel to the x -axis
- has a slope -1

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Complex conjugate of $i / (1 - i)$ is:-

- $-\frac{1}{2} (1+i)$
- $\frac{1}{2} (1-i)$
- $-\frac{1}{2} (1-i)$
- $\frac{1}{2} (1+i)$

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Crystalline structure of material exhibits :-

- Ordered arrangement of atoms
- Bonded atoms
- diffused atoms
- Coordinated atoms

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The magnetic line of force travel from :-

- South Pole to North Pole
- North Pole to South Pole
- East pole to west pole
- West pole to east pole

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Which of the following is a hard acid?

- Au^+
- Cu^+
- Ag^+
- Li^+

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Metal are formed from the:

- Hydrogen bond
- Ionic bond
- Metallic bond
- Covalent bond

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If in a triangle ABC, the altitudes from the vertices A,B,C on opposite sides are in HP, then $\sin A$, $\sin B$, $\sin C$, are in

- G.P
- A.P
- H.P
- none of the above

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The possible set of eigen values of a 4x4 skew-symmetric orthogonal real matrix is:-

- $\{0, \pm i\}$
- $\{\pm 1\}$
- $\{\pm i\}$
- $\{\pm i, \pm 1\}$

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Ferrite rods are used to sense the :-

- Optical signal
- Microwave signal
- Electrical signal
- Electromagnetic signal

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The general solution of the first order equation $\frac{dy}{dx} = \cos(x)$ is

- $y = \cos(x)+c$ where c is an arbitrary constant
- $y = \cos(x)$

- $y = \sin(x)+c$ where c is an arbitrary constant
- $y = \sin(x)$

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Acetylene has the point group:-

- C_{2v}
- D_{8h}
- D_{6h}
- C_{2h}

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Pick out the molecule which has zero dipole moment :-

- H_2O
- BCl_3
- NH_3
- SO_2

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A protective oxide layer is formed on the surface of metals to :-

- Prevent electricity leakage
- Prevent corrosion
- Prevent fire
- Prevent breakage

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The coordination number and oxidation state of Cr in $K_3(Cr(C_2O_4)_3]$ are _____.

- 3 and + 3
- 4 and +2
- 3 and 0
- 6 and + 3

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If a transformation $y=uv$ transforms the given differential equation

$f(x)y'' - 4f'(x)y' + g(x)y = 0$ into the equation of the form $v'' + h(x)v = 0$ then u

must be

- xf
- $1/2f$
- f^2
- $1/f^2$

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Conductivity of metal arises due to the presence of :-

- Free atoms
- Free holes
- Impurities
- Free electrons

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Inverter is a device that converts :-

- DC power to AC power
- optical to electrical power
- AC power to DC power
- DC power to DC power

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If roots of the equation $x^2-bx+c=0$ be two consecutive integers, then b^2-4ac equals

- 2
- 1
- 3
- 2

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The bond that gives the most intense band in the infrared spectrum for its stretching vibration is:-

- O-H
- S-H
- C-H

- N-H

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An electrical transformer works under the principle of :-

- coil induction
- biased induction
- Self induction
- mutual induction

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Band gap of the semiconductor decreases with:-

- Increase with combination
- Increase in temperature
- Increase with doping
- Increase in pressure

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Thermal expansion of materials arise from :-

- asymmetry of potential energy curve
- weak bonds
- strong bonds
- thermal vibrations

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Due to Schottky defects, the density of the crystal _____

- Increases slightly
- Decreases slightly
- Remains same
- Increases appreciable

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Real solutions to the logarithmic equation $\ln(x) + \ln(2) = 3$

- $e^3 / 2$
- $e^3 / \ln(2)$
- $3 / \ln(2)$

- $3^e / 2$

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The following is the example of optical waveguide :-

- Optical fiber
 Silicon
 Quartz
 Glass

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If $x > 1$ and $\frac{\sqrt{x}}{x^3} = x^m$, what is the value of m ?

- 2
 -2
 $-\frac{5}{2}$
 $-\frac{3}{2}$

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The complement of a closed set is:-

- open or closed
 Open set
 closed set
 none of the above

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For lasing action, the semiconductor should have

- negative gap
 direct gap
 indirect gap
 gap ≥ 5 eV

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The AC power is the product of :-

- I x R
- V x R
- none of the above
- I x V

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The degree of freedom when ice, water and water vapour coexist in equilibrium is :-

- 1
- Triple point
- 0
- 1

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The bond order in CO is _____.

- 0
- 3
- 4
- 2

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Find two numbers whose sum is 26 and whose product is 165

- 9 and 17
- 10 and 16
- 11 and 15
- 12 and 14

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The diborane is

- $[B_6H_{12}]$
- $[B_2H_{12}]$
- $[B_6H_6]^{2-}$
- $[B_2H_6]$

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The electrical resistivity of a semiconductor :-

- Increases with temperature
- Does not change with temperature
- Decreases with temperature
- Increases at lower temperature and decreases at higher temperature

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The region of electromagnetic spectrum employed in the electron spin resonance (ESR) spectroscopy is:-

- infrared
- visible
- radiowave
- microwave

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From the following, the most acidic compound is _____.

- HF
- CH₄
- NH₃
- H₂O

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A parabola has the origin as its focus and the line $x = 2$ as the directrix. Then the vertex of the parabola is at:-

- (1,0)
- (2,0)
- (0,1)
- (0,2)

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The error function of ∞ is :-

- 0
- 1
- 1
- ∞

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$$\int \cos(x) dx$$

- tan(x)
- Sin(x)
- sec(x)
- sin(x)

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The first order differential equation $M(x,y) dx + N(x,y) dy = 0$ is exact if:-

- $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$
- $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$
- $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$
- $\frac{\partial M}{\partial x} \neq \frac{\partial N}{\partial y}$

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The wave character of electron was verified by _____ experiment.

- Mass spectrum
- Thermal analysis
- Diffraction
- Photoelectric effect

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If $y = \sum_{m=0}^{\infty} C_m x^{r+m}$ is assumed to be a solution of the differential equation

$$x^2 y'' - xy' - 3(1+x^2)y = 0$$
 then the values of r are

- 1 and 3
- 1 and -3
- 1 and 3
- 1 and -3

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If $A^2 - A + I = 0$, then the inverse of A is:-

- I-A
- A
- A-I
- A+I

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Hydrogen bonds are stronger than :-

- vander Waals bonds
- covalent bonds
- ionic bonds
- metallic bonds

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In which one of the following reaction nitrogen is not reduced:-

- $\text{NO}_3^- \longrightarrow \text{NO}$
- $\text{NO}_2 \longrightarrow \text{NO}_2^-$
- $\text{NO}_3^- \longrightarrow \text{NH}_4^+$
- $\text{NH}_4^+ \longrightarrow \text{N}_2$

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The set of real number is:-

- unbounded above
- countable set
- finite set
- Bounded above

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If $|z^2-1|=|z|^2+1$, then z lies on:-

- circle
- ellipse
- imaginary axis
- Real axis

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Dimensional representation of Force (F) is :-

- [Mass]*[Length]
- [Mass]*[Length]*[Time⁻²]
- [Mass]*[Time⁻²]
- Kg/s

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There are _____ number elements present in the periodic table:-

- 122
- 118
- 175
- 108

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The bulkiest side group in the monomer is in:-

- PTFE
- PVC
- teflon
- Polystyrene

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In Joule-Thomson expansion :-

- $dG = 0$
- $ds = 0$
- $dH = 0$
- $dE = 0$

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The conjugate base of NH_4^+ is :-

- NH_3
- OH^-
- KOH
- NH_4OH

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For the reaction $A \longrightarrow \text{Products}$, the plot of $[A]$ vs time is a straight line. The order of a reaction is :-

- Pseudo first
- Zero
- First
- Second

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A 1S orbital refers to :-

- A one electron wave function
- A hermitian operator
- A circular track in an atom in which an electron travels
- An observable property of the system

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The fastest diffusing species in Fe is :-

- Ni
- W
- C
- H

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The pH of a 10^{-8} molar HCL solution at 25°C is nearly _____.

- 7
- 1
- 14
- 10

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Vitamin B_{12} is the coordination compound of :-

- Fe
- CO
- Zn
- Mg

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If $\begin{bmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{bmatrix} = x + iy$ then

- x = 0, y = 0
- x = 0, y = 3
- x = 3, y = 1
- x = 1, y = 3

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The straight lines $L_1: x = 0$, $L_2: y = 0$ and $L_3: x + y = 1$ are mapped by the transformation $w = z^2$ into the curves C_1 , C_2 and C_3 respectively. The angle of intersection between the curves at $w = 0$ is:-

- $\pi/4$
- $\pi/4$
- π
- 0

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The structure of SF_4 is _____.

- Tetrahedral
- Square planar
- Trigonal pyramidal
- Octahedral

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Example of an aromatic side chain amino acid is :-

- Glycine
- Proline
- Tryptophan
- Lysine

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In anaerobic respiration, energy liberated by one molecule of glucose is:-

- 18 ATP

- 30 ATP
- 38 ATP
- 40 ATP

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Non-branching helical structure consisting of glucose residues in alpha-1,4 linkage is :-

- Cellulose
- Amylopectin
- Amylose
- Lignin

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Methylation of cytosine in regulating gene expression is referred as :-

- Mutation
- Epigenetic transformation
- Single Nucleotide Polymorphism
- Genetic Engineering

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Photosynthesis occurs in :-

- Cytoplasm
- Nucleus
- Golgi
- Thylakoid

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RNA Polymerase is an enzyme that:-

- Does Translation of RNA
- Carry out replication of RNA
- Does Transcription of DNA
- Carry out replication DNA

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Which of the following is not true for photosynthesis:-

- Light reaction cannot take place in the absence of light

- Dark reactions takes place in the absence of light
- Dark reaction cannot take place in the presence of light
- Light reaction takes place in the presence of light

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Blood corpuscles which help blood clotting at the site of injury are:-

- Platelets
- RBCs
- WBCs
- RBCs and WBCs

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In photosynthesis, CO₂ fixation takes place in

- Light reaction
- Dark reaction
- In the absence of light
- In the presence of light

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Psychrophiles are bacteria that grow in the temperature range of

- 30 °C to 45 °C ;
- Above 100 °C
- 10 °C to 20 °C ;
- 45 °C to 75 °C ;

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In polymerase chain reaction, denaturization temperature is set around :-

- 65 °C
- 95 °C
- 25 °C
- 37 °C

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Which is one of the most poisonous excretory substance?

- Uric Acid

- Urea
- Ammonia
- Hippuric Acid

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Bacterial resistance to antibiotics is a genetic trait that is carried in the bacterial cell in:-

- Plasmid
- Chromosome
- Interon
- Centromere

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The length of a DNA molecule about 3×10^6 base pair is:-

- 1mm
- 1cm
- 1m
- $1\mu\text{m}$

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123. Which of the following best describes anaerobic respiration?

- Oxidation of food in the presence of oxygen
- Oxidation of food in the absence of oxygen
- Uptake of CO_2 and release of O_2
- Release of CO_2 with the uptake of O_2

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Number of ATP utilized for the formation of glucose in Calvin Cycle is:-

- 12 ATP
- 24 ATP
- 18 ATP
- 6 ATP

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The storage polysaccharides of animal cell is called:-

- Starch

- Saccharin
- Lipid
- Glycogen

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Type of function protein porin perform is:-

- Specific binding
- Transport
- Degradation of proteins
- Gene activations

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Tachycardia mean:

- Irregular heart beat
- Stiffening of arteries
- Increased heart beat
- Decreased heart beat

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In biochemical reaction when an inhibitor closely resembles the substrates in its molecular structure to inhibit the activity of enzyme, it is referred as:-

- Competitive inhibitor
- Co-substrate
- Co-inhibitor
- Competitive substrate

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In a double strand DNA, number of hydrogen bonds formed in C-G and T-A base pairing are:-

- Two in both cases
- Three and Two
- Three in both cases
- Two and Three

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In thermodynamics, Carnot cycle is also called as:-

- Constant volume cycle
- Constant pressure cycle
- Constant temperature cycle
- Constant heat cycle

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The de-emphasis filter in an FM receiver comes:-

- After FM demodulator and before baseband and filter
- Before RF amplifier
- After baseband filter
- Before FM demodulator

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In cooling and humidifying process, the spray water:-

- Lowers both the dry-bulb temperature and the dewpoint temperature
- Lowers the dry-bulb, wet-bulb and dewpoint temperatures
- Lowers the dry-bulb temperature and raises the dewpoint temperature
- Raises both the dry-bulb temperature and the dewpoint temperature

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The property characteristic of ferroelectric materials is:-

- Spontaneous magnetization
- Spontaneous polarization
- Dielectric breakdown
- Dielectric relaxation

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Adsorbents in absorption system separate from the refrigerant:-

- Only when sufficiently heated
- Only when cooled
- By reacting with water
- By means of a filter

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In diesel cycle:-

- Compression ratio is greater than the expansion ratio
- Compression ratio is less than the expansion ratio
- Compression ratio + expansion ratio equals 1
- Compression ratio and expansion ratio are the same

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At isoelectric pH, proteins exists in:-

- More negatively charged than positive charge
- As Zwitterions
- Negatively charged form
- Positively charged form

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The vanes of a centrifugal pump are generally :-

- Radial
- Curved backward
- Twisted
- Curved forward

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Heat in the absorption-refrigeration cycle is applied at:-

- Evaporator
- Generator
- Cooler
- Absorber

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Determine the quantity of heat required to vaporize 2 m^3 of water at 0°C if the latent heat of vaporization of water at that temperature is 2257 kJ/Kg

- 2257 kJ
- 1128.5 kJ
- 4514 kJ
- 2000 kJ

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The unit in the refrigeration cycle in which heat is rejected is the:-

- Evaporator
- Compressor
- Coil
- Condenser

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Increasing the pressure of a refrigerant :-

- Does not affect its temperature
- Increase its temperature
- Lowers its boiling point
- Decrease its temperature

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On a psychrometric chart, what does a vertical downward line represent?

- Humidification
- Dehumidification
- Adiabatic saturation
- Sensible cooling

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Which one of the following materials is a latent heat storage material?

- Magnesium oxide
- Hitec
- Servotherm
- Lauric acid

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The Rockwell number refers to a material's :-

- Malleability
- Hardness
- Plasticity
- Toughness

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Which of the following pump does not fall under the category of turbo machines ?

- Rotary
- Mixed flow
- Centrifugal
- Axial flow

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Cross flow heat exchangers are popularly used for heat transfer:-

- liquid and liquid
- liquid and evaporating fluid
- condensing fluid and liquid
- gas and gas or liquid and gas

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Which one of the following is correct?

Environmental protection agencies advise against the use of chlorofluorocarbon refrigerants because these react with:-

- Plant and cause greenhouse effect
- Water vapour and cause acid rain
- Oxygen and cause its depletion
- Ozone layer and cause its depletion

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Molecules upon binding to an enzyme, regulate the activity of enzyme are termed as:-

- Metabolites
- Promoters/ suppressors
- Mediators
- Activators/ inhibitors