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| Division | 12th |
| Subject | Biology |
| Chapter | Biotechnology – Principles and Processes |
| Author | Anand |
| Category | 1 |

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| The DNA molecule to which the gene of interest is integrated for cloning is called  2015 |
| template |
| carrier |
| transformer |
| vector. |
| d |
| Molecular biology and recombinant technology use this most; it has contained own genes/DNA |
| The correct answer is Vector; It is a DNA molecule used as a vehicle to artificially carry foreign genetic material into another cell, A vector containing foreign DNA is termed as recombinant DNA. The desired foreign DNA segment can be introduced into these vectors with the help of restriction enzymes and ligase. |
| Bioprocess Engineering: Vectors |

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| The cutting of DNA at specific locations became possible with the discovery of |
| selectable markers |
| ligases |
| restriction enzymes |
| probes. |
| c |
| It is also known as Molecular scissors |
| The correct answer is Restriction enzymes; Genetic engineering is possible because of special enzymes that cut DNA. These enzymes are called restriction enzymes or restriction endonucleases. Restriction enzymes are proteins produced by bacteria to prevent or restrict invasion by foreign DNA. They act as DNA scissors, cutting the foreign DNA into pieces so that it cannot function. These enzymes are routinely used for DNA modification in laboratories and are a vital tool in molecular cloning |
| Bioprocess Engineering: Restriction enzymes |

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| Which one of the following techniques made it possible to genetically engineer living organisms? Mains 2011 |
| Recombinant DNA techniques |
| -ray diffraction |
| Heavier isotope Labelling |
| Hybridization |
| a |
| Genetical messengers were DNA and RNA |
| The correct answer is Recombinant DNA Techniques; DNA molecules formed by laboratory methods of genetic recombination to bring together genetic material from multiple sources, creating sequences that would not otherwise be found in biological organisms. It is done by the process of recombinant DNA techniques. |
| Bioprocess Engineering: Recombinant DNA |

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| Which of the following are used in gene cloning?  2010 |
| Nucleoids |
| Lomasomes |
| Mesosomes |
| Plasmids |
| D |
| It is also known as a type of vector |
| The correct answer is plasmids. A cloning vector is a small piece of DNA, taken from a virus, a plasmid, or the cell of a higher organism, that can be stably maintained in an organism, and into which a foreign DNA fragment can be inserted for cloning purposes. The plasmids most commonly used in recombinant DNA technology replicate in E. coli. Most plasmid vectors contain a drug-resistance gene that confers additional survival properties to the bacteria. The DNA to be cloned replaces any one of these genes. |
| Bioprocess Engineering: Plasmids |

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| Manipulation of DNA in genetic engineering became possible due to the discovery of  2005 |
| restriction endonuclease |
| DNA ligase |
| transcriptase |
| primase |
| a |
| It is known to cut DNA into fragments |
| The correct answer is Restriction endonucleases.These are isolated from bacterial cells and are tools for molecular biologists, several hundred restriction enzymes are now known, each with a specific sequence requirement and cut DNA specific sites therefore, digesting DNA with a restriction enzyme creates a characteristic set of fragments. So which the genetic traits can be modified easily in a genome. |
| Principles of Biotechnology: Genetic Engineering |

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| The bacteria generally used for genetic engineering is  2000 |
| Agrobacterium |
| Bacillus |
| Pseudomonas |
| Clostridium |
| a |
| It is a widely used soil pathogen |
| The correct answer is Agrobacterium tumefaciens. It is a soil plant pathogenic bacterium that carries Ti plasmid. It can transfer a particular segment of the tumor-inducing (Ti) plasmid into the nucleus of infected cells. The transferred T-DNA is then integrated into the host genome and transcribed with it. This ability of Agrobacterium tumefaciens to transfer the T-DNA in the host genome is explored in genetic engineering to transfer the desired DNA segment of up 25kb, carrying the gene of the interest, into the genome of selected organisms |
| Principles of Biotechnology: Steps in genetic modification of organism |

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| Which of the following is related to genetic engineering?  1999 |
| Heterosis |
| Mutation |
| Plastid |
| Plasmid |
| d |
| It is a small circular DNA Molecule |
| The correct answer is Plasmids, Which are low molecular weight extrachromosomal DNA that carries origin of replication, restriction sites and selectable markers to confer readily selectable phenotypic traits on host cells. Plasmids require very few genes for their own replication and rest of it can be deleted and foreign sequences can be added to the plasmid which in turn makes them a suitable candidate to serve as a vector for gene transfer. |
| Principles of Biotechnology: Genetic Engineering |

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| Genetic engineering is possible, because |
| we can cut DNA at specific sites by endonucleases like DNase I |
| restriction endonucleases purified from bacteria can be used in vitro |
| the phenomenon of transduction in bacteria is well understood |
| we can see DNA by electron microscope. |
| b |
| Molecular scissors invention |
| The correct answer is restriction endonucleases purified from bacteria can be used in vitro, because Genetic engineering is also called genetic modification. This method involves the manipulation of the genome of any organism using biotechnology techniques. DNases which act on specific positions or sequences on the DNA are called as restriction endonucleases. |
| Principles of Biotechnology: Genetic Engineering |

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| When scientists make an animal superior by view of genotype, introducing some foreign genes in it, is called  1996 |
| Immunization |
| Genetic engineering |
| Tissue culture |
| Biotechnology |
| b |
| It is also known as Recombinant technology |
| The correct answer is Genetic engineering, which is the direct manipulation of an organism's genome using biotechnology. It is a set of technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms. |
| Principles of Biotechnology: Genetic Engineering |

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| Which of the following organelles is related with genetic engineering?  1994 |
| Mitochondria |
| Plasmids |
| Golgi bodies |
| Lysosomes |
| b |
| It is circular DNA Molecule |
| The correct answer is plasmid.is a small DNA molecule that is physically separate from, and can replicate independently of, chromosomal DNA within a cell. Plasmids play an integral role in genetic engineering experiments. In genetic engineering, DNA is required to move from test-tube environment to cellular environment. |
| Bioprocess engineering: Plasmids |

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| Which one of the following is a case of wrong matching? |
| Somatic fusion of two hybridization diverse cells |
| Vector DNA- site for t RNA synthesis |
| Micropropagation- Invitro production of plants in large numbers |
| Callus- unorganised mass of cells produced in tissue culture |
| b |
| Genetic modifications |
| The correct option is 'Vector DNA - Site for t RNA synthesis' - Vector DNA is used in the recombinant DNA technology for the transfer of the desired character into the wholesale it is not the site of synthesis of t RNA. |
| Bioprocess Engineering: Cloning |

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| Which one of the following statements is not true regarding gel electrophoresis technique?  2022 |
| The process of extraction of separated DNA strands from gel is called elution |
| The separated DNA fragments are stained by using ethidium bromide |
| The presence of chromogenic substrate gives blue coloured DNA bands on the gel |
| Bright orange-coloured bands of DNA can be observed in the gel when exposed to UV light |
| c |
| Chromogenic substance is ethidium bromide |
| The Correct answer is the presence of chromogenic substrate gives blue coloured DNA bands on the gel; Because ethidium bromide produces bright orange coloured bands when exposed to UV light. |
| Tools of Recombinant Technology; Gel electrophoresis |

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| In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme? |
| 5' G A T A C T 3' ; 3' C T A T G A 5' |
| G A A T T C C T T A A G |
| C A |
| G T A T T C C A T A A G 5' |
| b |
| In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme |
| The correct answer is G A A T T C C T T A A G ; Because Palindromic in DNA refers to a sequence of base pairs that reads the same on the two strands when the orientation of the reading is kept the same. |
| Tools of Recombinant Technology: Palindromic Nucleotide sequence |

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| Given below are two statements:  Statement I: Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence. Statement II: Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site. In the light of the above statements, choose the most appropriate answer from the options given below:  2022 |
| Both Statement I and Statement II are correct |
| Both Statement I and Statement II are incorrect |
| Statement I is correct but Statement II is incorrect |
| Statement I is incorrect but Statement II is correct |
| a |
| Restriction enzymes are known cut the DNA |
| The correct answer is Both statement I and Statement II are correct; Because Restriction enzymes are molecular scissors, Two types od restriction enzymes are endonuclease and exonucleases. Exonucleases helps in removing nucleotides from the ends of DNA. |
| Tools of recombinant DNA Technology; Restriction endonuclease |

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| Which of the following is not a desirable feature of a cloning vector?  2022 |
| Presence of origin of replication |
| Presence of a marker gene |
| Presence of single restriction enzyme site |
| Presence of two or more recognition sites |
| d |
| Cloning vector is acts as a vehicle |
| The correct answer is Presence of two or more recognition sites ; Vector molecules should have a single recognition site. Multiple recognition sites will cut vector molecules at more than one. So it have the origin of replication. |
| Bioprocess engineering: Cloning |

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| DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear as  2021 |
| Bright blue bands |
| Yellow Bands |
| Bright Orange Bands |
| Dark red bands |
| c |
| Chromogenic substance is ethidium bromide |
| The correct answer is Bright Orange Bands; DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear bright orange. They appear orange because ethidium bromide releases an orange fluorescence at when exposed to UV light. Ethidium bromide is the intercalating agent that stacks in between the nitrogenous bases. |
| Tools of Recombinant Technology; Gel Electrohoresis |

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| Plasmid pBR322 has PstI restriction enzyme site within gene that confers ampicillin resistance. If this enzyme is used for inserting a gene for -galactoside production and the recombinant plasmid is inserted in an E. coli strain  2021 |
| it will be able to produce a novel protein with dual ability. |
| it will not be able to confer ampicillin resistance to the host cell |
| the transformed cells will have the ability to resist ampicillin as well as produce -galactoside |
| it will lead to lysis of host cell |
| b |
| Insertional activation |
| The Correct answer is “It will not be able to confer ampillicin resistance to the host cell”. Due to the insertion of the gene at Pst I of ampR region of pBR322, the ampR gene is inactivated.  This is called insertional activation. As a result, ampicillin resistance would not be conferred. |
| Features facilitating cloning into vector: Example |

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| A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is  2021 |
| poly (A) tail sequences |
| degenerate primer sequence |
| okazaki sequences |
| palindromic nucleotide sequences |
| d |
| BamHI |
| The correct answer is Palindromic nucleotide sequences, because palindromic sequence is a nucleic acid sequence in DNA/RNA molecules. Reading from 5' to 3' in one strand is similar to the sequence in 5' to 3' on the complementary strand. Example- BamHI, a restriction endonuclease acts on the palindromic sequence 5'-GGATCC-3'. |
| Tools of recombinant DNA Technology: Endonuclease |

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| Identify the wrong statement with regard to restriction enzymes  2020 |
| Each restriction enzyme functions by inspecting the length of a DNA sequence |
| They cut the strand of DNA at palindromic sites |
| They are useful in genetic engineering |
| Sticky ends can be joined by using DNA ligases |
| d |
| Restriction enzymes are molecular scissors |
| The correct answer is Sticky ends can be joined by using DNA ligases, Because DNA ligase not belongs to the family of restriction enzymes, It’s a nucleotide transferase family. In genetic engineering, restriction endonucleases are employed to create'recombinant' DNA molecules, which are made up of DNA from different sources/genomes |
| Tools of recombinant DNA Technology; Restriction enzymes |

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| Choose the correct pair from the following  2020 |
| Ligases - Join the two DNA molecules |
| Polymerases-Break the DNA into fragments |
| Nucleases-Separate the two strands of DNA |
| Exonucleases -Make cuts at specific positions within DNA |
| a |
| Restriction enzymes |
| The correct option is Ligases - Join the two DNA molecules; DNA ligase is an enzyme which can connect two strands of DNA together by forming a bond between the phosphate group of one strand and the deoxyribose group on another. Nucleases cleave the phosphodiester bonds of nucleic acids. Exonucleases make cuts at the ends of the DNA strand. Polymerases help in the polymerization of a DNA or RNA molecule. |
| Tools of recombinant DNA Technology : Role of restriction enzymes |

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| The specific palindromic sequence which is recognised by is  2020 |
| 5' - GAATTC –  - CTTAAG - 5' |
| 5' - GGAACC -  - CCTTGG - 5' |
| - GGATCC -  - CCTAGG - 5' |
| - GAATTC –  - CTTAAG - 3' |
| a |
| Sticky Ends were produced |
| The correct answer is    The Specific palindromic sequence recognised by EcoRI will produce to have sticky ends. |
| Tools of recombinant DNA Technology: Palindromic Nucleotide sequence |

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| The sequence that controls the copy number of the linked DNA in the vector, is termed  (2020) |
| selectable marker |
| Ori site |
| palindromic sequence |
| recognition site |
| B |
| The start site of replication |
| The correct answer is Ori site; Ori, which stands for "Origin of Replication," is a sequence from which replication begins. The ori is where DNA replication starts, allowing plasmids to replicate themselves in order to live inside cells. Plasmids utilize the host's machinery to create extra copies even though their replicons often differ from those used to replicate the chromosomal DNA of the host. |
| Cloning vectors; origin of replication |

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| In gel electrophoresis, separated DNA fragments can be visualized with the help of  2020 |
| acetocarmine in bright blue light |
| ethidium bromide in UV radiation |
| acetocarmine in UV radiation |
| ethidium bromide in infrared radiation |
| b |
| Chromogenic substance |
| The correct option is ethidium bromide; In UV radiation the separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation as we cannot see pure DNA fragments in the visible light and without staining. We generally observe bright orange-coloured bands of DNA in a ethidium bromide stained gel when exposed to UV light. |
| Tools of recombinant DNA Technology; gel electrophoresis |

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| Following statements describe the characteristics of the enzyme restriction endonuclease. Identify the incorrect statement  2019 |
| The enzyme recognises a specific palindromic nucleotide sequence in the DNA |
| The enzyme cuts DNA molecule at identified position within the DNA |
| The enzyme binds DNA at specific sites and cuts only one of the two strands |
| The enzyme cuts the sugar-phosphate backbone at specific sites on each strand |
| c |
| Molecular scissors – Produce sticky ends |
| The correct option is “The enzyme binds DNA at specific sites and cuts only one of the two strands”. Restriction endonucleases find their specific recognition sequence (specific palindromic nucleotide sequence) on DNA. It then binds to the DNA and cuts each of the two strands of the double helix at specific points in their sugar-phosphate backbones. |
| Tools of recombinant DNA Technology:Restriction endonuclease |

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| A selectable marker is used to  2019 |
| help in eliminating the non-transformants, so that the transformants can be regenerated |
| identify the gene for a desired trait in an alien organism |
| select a suitable vector for transformation in a specific crop |
| mark a gene on a chromosome for isolation using restriction enzyme |
| a |
| Transformation of genes |
| The correct answer is “Help in eliminating the non-transformants , so that transformants can be generated”. A marker gene is a gene used to determine if a nucleic acid sequence has been successfully inserted into an organism DNA. The gene that provide resistance to various antibiotics ae used as selective markers in cloning vectors. |
| Cloning vectors: Selectable markers |

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| Given below are four statements pertaining to separation of DNA fragments using gel electrophoresis. Identify the incorrect statements.  (i) DNA is negatively charged molecule and so it is loaded on gel towards the anode terminal.  (ii) DNA fragments travel along the surface of the gel whose concentration does not affect movement of DNA.  (iii) Smaller the size of DNA fragment larger is the distance it travels through it.  (iv) Pure DNA can be visualized directly by exposing UV radiation.  Choose correct answer from the options given below.  Odisha NEET 2019 |
| (i), (iii) and (iv) |
| (i), (ii) and (iii) |
| (ii), (iii) and (iv) |
| (i), (ii) and (iv) |
| d |
| DNA electrophoresis is based on charge. |
| DNA is a negatively charged molecule, so they can be separated by forcing them to move towards the anode under an electric field. DNA fragments separate according to size through the pores of agarose gel. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide then followed by exposure to UV radiation |
| Tools of recombinant DNA Technology: Separation and isolation of DNA fragments |

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| Which of the following is commonly used as a vector for introducing a DNA fragment in human lymphocytes?  2018 |
| Retrovirus |
| Ti plasmid |
| phage |
| pBR322 |
| a |
| Largest number of copies in that plasmid |
| The correct answer is Retroviruses, which cause cancer in animals including humans. So modified retroviruses are used to transfer desirable genes into animal cells. It is used in gene therapy, in which lymphocytes from blood of patient are taken and grown in culture medium outside the body, a functional gene is introduced by using a retroviral vector into these lymphocytes which are again reintroduced into the patient body |
| Cloning vectors: Vectors for cloning genes in plants and animals |

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| The DNA fragments separated on an agarose gel can be visualised after staining with  2017 |
| acetocarmine |
| aniline blue |
| ethidium bromide |
| bromophenol blue |
| c |
| Chromogenic dye |
| The correct answer is Ethidium bromide; The separated DNA fragments can be seen only after staining them with a compound known as ethidium bromide (EtBr) followed by exposure to UV radiation as bright orange-coloured bands |
| Tools of Recombinant Technology: Gel electrophoresis |

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| DNA fragments are  2017 |
| negatively charged |
| neutral |
| either positively or negatively charged depending on their size |
| positively charged |
| a |
| The DNA fragments have phosphate ions which are electron-rich and are charged correspondingly. |
| The correct answer is Negatively charged; DNA is the hereditary material in humans and almost all other organisms. The DNA fragments have Phosphate ions which are negatively charged due to additional electrons and due to that, the whole DNA fragment is imparted a negative charge. |
| Tools of Recombinant Technology: Gel electrophoresis |

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| A gene whose expression helps to identify transformed cell is known as  2017 |
| vector |
| plasmid |
| structural gene |
| selectable marker |
| d |
| To eliminate transformants |
| The correct answer is Selectable markers; Some genes called "selectable markers" help in selecting those host cells which contain the vectors (transformants) and eliminating the non-transformants. |
| Cloning vectors: Selectable markets |

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| What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis  2017 |
| The smaller the fragment size, the farther it moves |
| Positively charged fragments move to farther end |
| Negatively charged fragments do not move |
| The larger the fragment size, the farther it moves |
| a |
| Size of the DNA |
| The correct answer is The smaller the fragment size, the farther it moves; Electrophoresis is a technique used for the separation of substances of different ionic properties. Since the DNA fragments are negatively charged molecules, they can be separated by allowing them to move towards the anode. DNA fragments move towards the anode according to their molecule size through the pores of agarose gel. 'Thus, the smaller fragments move farther away as compared to larger fragments |
| Tools of Recombinant Technology: Elution |

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| A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using  NEET-II 2016 |
| EcoRI |
| TAQ Polymerase |
| Polymerase II |
| Ligase |
| d |
| Commonly used transferase enzyme |
| The correct answer is Ligase; is a class of enzymes that catalyse the formation of covalent bonds using the energy released by the cleavage of ATP. Ligases are important in the synthesis and repair of many biological molecules, including DNA ligase and used in genetic engineering to insert foreign DNA into cloning vectors |
| Tools of Recombinant Technology: Restriction enzymes |

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| Which of the following restriction enzymes produces blunt ends  NEET-II 2016 |
| SaII |
| EcoRV |
| XhoI |
| HindIII |
| B |
| Restriction endonuclease by E.coli |
| The answer is EcoRV ; which is a type II restriction endonuclease isolated from certain strains of E.coli. It creates blunt ends. It recognises the palindromic sequence of 6 bases. SalI, XhoI and HindIII restriction enzymes produce sticky ends |
| Tools of Recombinant Technology; Restriction endonuclease |

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| Which of the following is not a feature of the plasmids?  NEET I 2016 |
| Transferable |
| Independent replication |
| Circular structure |
| Single stranded |
| b |
| Ori site |
| The correct answer is Independent replication ; Plasmids are extra-chromosomal, self-replicating, usually circular, double-stranded DNA molecules that serve as vectors which carry foreign DNA segment and replicate inside host cell |
| Cloning vectors: features facilitating cloning into a vector |

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| Which of the following is a restriction endonuclease?  NEET I 2016 |
| DNase I |
| Rnase |
| Hind II |
| Protease |
| c |
| Haemophilus influenzae |
| The correct answer is Hind II , which is the first restriction endonuclease. It was isolated from Haemophilus influenzae Rd. It always cut DNA at specific position producing blunt ends. DNase I is an endonuclease that cleaves DNA preferentially at phosphodiester linkages adjacent to a pyrimidine nucleotide. RNase is a type of nuclease that catalyses the degradation of RNA into smaller components. It can be endoribonuclease or exoribonuclease. A protease is an enzyme that perform proteolysis, i.e., protein catabolism by hydrolysis of the peptide bonds |
| Tools of Recombinant technology: Restriction endonuclease |

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| The introduction of T-DNA into plants involves  2015 |
| exposing the plants to cold for a brief period |
| allowing the plant roots to stand in water |
| infection of the plant by Agrobacterium tumefaciens |
| altering the of the soil, then heat-shocking the plants |
| c |
| Ti Plasmid- Tumour Inducing |
| The correct answer is infection of the plant by Agrobacterium tumefaciens; Ti plasmid (tumor inducing) from the soil bacterium Agrobacterium tumefaciens is effectively used as vector for gene transfer to plant cells. The part of Ti plasmid transferred into plant cell DNA, is called the T-DNA. This T-DNA with desired DNA spliced into it, is inserted into the chromosomes of the host plant where it produces copies of itself. Such plant cells are then cultured, induced to multiply and differentiate to form plantlets. By transferring into soil, the plantlets grow into mature plants, carrying the foreign gene, expressed throughout the new plant |
| Cloning vectors: Introducing recombinant DNA in the host cells |

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| Which vector can clone only a small fragment of DNA?  2014 |
| Bacterial artificial chromosome |
| Yeast artificial chromosome |
| Plasmid |
| Cosmid |
| c |
| Circular DNA molecule |
| The correct answer is Plasmids have been modified to be used as vectors. They can clone DNA fragments of about size while cosmid can carry upto , YAC can carry upto 1000 and BAC can carry around long DNA fragments. |
| Cloning vectors: features facilitating cloning into a vector |

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| Commonly used vectors for human genome sequencing are  2014 |
| T-DNA |
| BAC & YAC |
| Expression Vectors |
| T/A Cloning vectors |
| b |
| Larger in size |
| The correct answer is BAC & YAC; Bacterial artificial chromosome (BAC) vectors are based on natural, extra-chromosomal plasmid of E. coli. BAC vector contains genes for replication and maintenance of the F-factor, a selectable marker and cloning site. These vectors can accommodate upto 300-350 kb of foreign DNA and are also being used in genome sequencing project. Yeast artificial chromosome (YAC) vectors are used to clone DNA fragments of more than in size. Therefore, they have been exploited extensively in mapping the large genomes, e.g., in the Human Genome Project. These vectors contain the telomeric sequence, the centromere and the autonomously replicating sequence from yeast chromosomes |
| Cloning vectors: pros of plasmids and bacteriophage |

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| The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of  2013 |
| insertional inactivation of alpha galactosidase in recombinant bacteria |
| inactivation of glycosidase enzyme in recombinant bacteria |
| non-recombinant bacteria containing beta galactosidase |
| insertional inactivation of alpha galactosidase in non-recombinant bacteria |
| C |
| Colour of transformed cells |
| The correct answer is non-recombinant bacteria containing beta galactosidase ; The presence of restriction sites within the markers tetr and of plasmid permits an easy selection for cells transformed with recombinant plasmid. Insertion of the DNA fragment into the plasmid makes antibiotic resistance genes nonfunctional, for example, insertion of the DNA fragment into the plasmid (pBR322) using Pst I or Pvu I makes nonfunctional. Bacterial cells containing such a recombinant pBR322 will be unable to grow in the presence of ampicillin, but will grow on tetracycline. This process, however, becomes burdensome because it requires simultaneous plating on two plates having different antibiotics. Thus, alternative selectable marker is developed to differentiate recombinants and nonrecombinants on the basis of their ability to produce colour in the presence of a chromogenic substance. Here, a recombinant DNA is inserted in the coding sequence of an enzyme -galactosidase. pUC 18 plasmid contains this gene which allows it to produce -galactosidase which degrades certain sugars and produces a blue pigment when exposed to specific substrate analog. If the plasmid in the bacterium does not have an insert, i.e., is nonrecombinant, the presence of chromogenic substrate gives blue coloured colonies. Presence of insert in the plasmid in recombinant bacterium does not produce any colour, such bacterial colonies are marked as recombinant colonies |
| Tools of recombinant technology: Separation and isolation of DNA fragments |

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| DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by |
| Electrophoresis |
| Restriction mapping |
| Centrifugation |
| Polymerase Chain Reaction |
| a |
| By charge |
| The correct answer is Electrophoresis is a technique used for the separation of substances of different ionic properties. Since the DNA fragments are negatively charged molecules, they can be separated by allowing them to move towards the anode. DNA fragments move towards the anode according to their molecule size through the pores of agarose gel. 'Thus, the smaller fragments move farther away as compared to larger fragments. |
| Tools of Recombinant technology: Gel electrophoresis |

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| The given figure is the diagrammatic representation of the E. coli vector pBR322. Which one of the given options correctly identifies its certain component(s)? |
| ori-original restriction enzyme |
| rop-reduced osmotic pressure |
| HindIII, EcoRI - selectable markers |
| -antibiotic resistance genes |
| d |
| Vector Components |
| The correct answer is ampR , ttR – Antibiotic genes; In pBR322, ori-represents site or origin of replication, rop-codes for proteins that take part in the replication of plasmid. Hind III, EcoRI- recognition sites of restriction endonucleases. and - antibiotic resistance genes. |
| Cloning vectors: Cloning sites: examples |

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| A single strand of nucleic acid tagged with a radioactive molecule is called 2012 |
| Vector |
| Selectable Marker |
| Plasmid |
| Probe |
| d |
| To view with markers |
| The correct answer is Probes, which are single stranded, radiolabelled molecules of nucleic acids with known sequence. The probes having sequence complementary to the gene to be identified are supplied. They bind with the particular gene segment. Radiation imaging identifies the location of that particular segment which bind with probe. Probes are used as identification tool. |
| Insertion of Recombinant DNA into host |

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| For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of |
| Silver or platinum |
| Platinum or zinc |
| Silicon or platinum |
| Gold or tungsten |
| d |
| Heavy metals alloys |
| The correct answer is Gold or tungsten ; A gene or a biolistic particle delivery system, originally designed for plant transformation, is a device for injecting cells with genetic information. The payload is an elemental particle of a heavy metal such as gold or tungsten coated with plasmid DNA. The device is used to transform almost any type of cell including plants, and is not limited to genetic material of the nucleus. It can also transform organelles, including plastids. |
| Insertion of Recombinant DNA into host |

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| Biolistics (gene-gun) is suitable for  Mains 2012 |
| disarming pathogen vectors |
| transformation of plant cells |
| constructing recombinant DNA by joining with vectors |
| DNA fingerprinting |
| b |
| Gene Delivery mechanism |
| The correct answer is used to transformation of plant cells; Biolistics is a technique for introducing genetic material into living cells, especially plant cells, in which DNAcoated microscopic particles (tungsten or gold particles) are bombarded with a very high velocity into the target cell using a special gun. The microprojectiles, typicaliy in diameter, are accelerated to high velocity by a specially modified small calibre gun and penetrate the cell walls and plasma membrane with minimal damage. Hence, the novel DNA can be inserted into intact plant cells ultimately transforming it without using a vector |
| Insertion of Recombinant DNA into host |

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| In genetic engineering, the antibiotics are used  Mains 2012 |
| as selectable markers |
| to select healthy vectors |
| as sequences from where replication starts |
| to keep the cultures free of infection |
| a |
| Hepls in selecting the host cells |
| The correct answer is as selectable markers; Selectable markers are those genes which help in selecting those host cells which contain vectors (i.e., transformants) and eliminating the non-transformants. The genes encoding resistance to antibiotics such as tetracycline, ampicillin, kanamycin, etc., are useful selectable markers for E.coli. Plasmid pBR322 has two resistance genes - ampicillin resistance and tetracycline resistance which are considered useful for selectable markers. The presence of restriction sites within the markers and permits an easy selection for cells transformed with the recombinant pBR322. Insertion of the DNA fragment into the plasmid using enzyme Pst I or Pvu I places the DNA insert within the gene amp ; this makes nonfunctional. Bacterial cells containing such a recombinant pBR322 will be unable to grow in the presence of ampicillin, but will grow on tetracycline. Similarly, when restriction enzyme Bam HI or SalI is used, the DNA insert is placed within the gene making it nonfunctional. Bacterial cells possessing such a recombinant pBR 322 will, therefore, grow on ampicillin but not on tetracycline. |
| Cloning vectors: selectable markers |

|  |
| --- |
| Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?  5' GAATTC 3'\_ CTTAAG\_ 5'  2011 |
| Replication completed |
| Deletion mutation |
| Start codon at the end |
| Palindromic sequence of base pairs |
| d |
| Sticky ends |
| The correct answer is palindromic sequence of base pairs; Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence. Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site. |
| Tools of Recombinant Technology: Palindromic nucleotide sequence |

|  |
| --- |
| There is a restriction endonuclease called EcoRI. What does "co" part in it stand for? 5011 |
| Colon |
| Coelon |
| Conenzyme |
| Coli |
| d |
| Bacteria |
| The correct answer is coli; The enzyme restriction endonuclease EcoRI is found in the colon bacteria E. coli. So, here 'co' stands for coli. According to nomenclature of restriction enzyme, the first letter used for the enzyme is the first letter of the genus name (in italics) of the bacterium, then comes the first two letters of its species (also in italics), next is the strain of the organism. At last is a Roman numeral signifying the order of discovery. Here, the enzyme EcoRI was isolated from the bacterium Escherichia coli (co), strain RY13(R) and it was first endonuclease (I) isolated from E.coli. |
| Tools of Recombinant technology: Restriction endonuclease |

|  |
| --- |
| Agarose extracted from sea weeds is used in  2011 |
| Spectrophotometry |
| Tissue culture |
| PCR |
| Gel electrophoresis |
| d |
| DNA fragments |
| The correct answer is gel electrophoresis, DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Agarose is a natural polymer extracted from sea weeds and is commonly used as a matrix |
| Tools of Recombinant technology; Gel electrophoresis |

|  |
| --- |
| Which one of the following is used as vector for cloning genes into higher organisms?  2010 |
| Baculovirus |
| Salmonella typhimurium |
| Rhizopus nigricans |
| Retrovirus |
| D |
| For Humans |
| The answer is Retroviruses; which is in animals have the ability to transform normal cells into cancerous cells. We have transformed these pathogens into useful vectors for delivering genes of interest to humans. Retroviruses have been disarmed and are now used to deliver desirable genes into animal cells. So, once a gene or a DNAA fragment has been ligated into a suitable retroviral vector it is transferred into a bacterial, plant or animal host |
| Cloning vectors: vectors for cloning genes in plants and animals |

|  |
| --- |
| DNA or RNA segment tagged with a radioactive molecule is called |
| vector |
| probe |
| clone |
| plasmid |
| b |
| To view with markers |
| The correct answer is Probes, which are single stranded, radiolabelled molecules of nucleic acids with known sequence. The probes having sequence complementary to the gene to be identified are supplied. They bind with the particular gene segment. Radiation imaging identifies the location of that particular segment which bind with probe. Probes are used as identification tool. |
| Tools of Recombinant Technology: Probes |

|  |
| --- |
| Restriction endonucleases are enzymes which  2010 |
| make cuts at specific positions within the DNA molecule |
| recognize a specific nucleotide sequence for binding of DNA ligase |
| restrict the action of the enzyme DNA polymerase |
| remove nucleotides from the ends of the DNA molecule. |
| a |
| Molecular scissors |
| The correct answer is Make cut at specific positions within the DNA Molecule; Restriction endonucleases were found by Arber in 1962 in bacteria. They act as "molecular scissors" or chemical scalpels. They recognize the specific base sequence at palindrome sites in DNA duplex and cut its strands. For example, restriction endonuclease EcoRI found in the colon bacteria E. coli recognizes the base sequence GAATTC in DNA duplex and cuts its strands between and . |
| Tools of Recombinant Technology: Restriction enzymes |

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| --- |
| In genetic engineering, a DNA segment (gene) of interest, is transferred to the host cell through a vector. Consider the following four agents (i-iv) in this regard and select the correct option about which one or more of these can be used as a vector/vectors.   1. Bacterium 2. Plasmid 3. Plasmodium 4. Bacteriophage   Mains 2010 |
| (i), (ii) and (iv) |
| (i) only |
| (i) and (iii) |
| (ii) and (iv) |
| d |
| Vector |
| The correct answer is Plasmid and bacteriophage, which are used as vectors in genetic engineering. Plasmid is an autonomously replicating circular extra-chromosomal DNA found in bacteria. They can be transferred from cell to cell in a bacterial colony. This characteristic is being used in biotechnology for transferring desirable gene into target gene of the host. Bacteriophage is a bacterial virus which can infect it, quickly multiply within and destroy (lyse) their host (virus) cells. During infection bacteriophages inject their DNA into these cells. The injected DNA selectively replicate and are expressed in the host that results in a multiplication of phages that ultimately burst out of the cell (by lysis). This ability of transferring DNA from the phage genome to specific host during infection process gave scientists the idea that specially designed phage vectors could be used for gene cloning. |
| Tools of Recombinant technology: Vectors |

|  |
| --- |
| Polyethylene glycol method is used for  2009 |
| biodiesel production |
| seedless fruit production |
| energy production from sewage |
| gene transfer without a vector. |
| d |
| Gene delivery |
| The correct answer is gene transfer without a vector; Direct gene transfer is the transfer of naked DNA into plant cells, but the presence of rigid plant cell wall acts as a barrier to uptake. Therefore, protoplasts are the favoured target for direct gene transfer. Polyethylene glycol mediated DNA uptake is a direct gene transfer method that utilizes the interaction between PEG, naked DNA, salts and the protoplast membrane to effect transport of the DNA into the cytoplasm. |
| Bioprocess Engineering: Recombinant DNA |

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| Which one of the following is commonly used in transfer of foreign DNA into crop plants? |
| Meloidogyne incognita |
| Agrobacterium tumefaciens |
| Penicillium expansum |
| Trichoderma harzianum |
| b |
| Widely used soil pathogen |
| The correct answer is Agrobacterium tumefaciens ; which has been extensively used in genetic engineering experiments. It is the causative agent of crown gall, an important disease of many commercial crops. This disease has come to be recognized in recent years as being caused by a DNA plasmid (Ti plasmid) carried by bacterium and transferred to the plant cells. Following the discovery of the relationship between crown gall and the Ti plasmid, this plasmid has come to be widely used in plant genetic engineering as a vector in order to inject a novel gene in host plant to form a transgenic plant. |
| Cloning Vectors: Vectors for genes in plants and animals |

|  |
| --- |
| Gel electrophoresis is used for  2008 |
| construction of recombinant DNA by joining with cloning vectors |
| isolation of DNA molecules |
| cutting of DNA into fragments |
| separation of DNA fragments according to their size. |
| d |
| DNA is negatively charged |
| Electrophoresis is a technique used for the separation of substances of different ionic properties. Since the DNA fragments are negatively charged molecules, they can be separated by allowing them to move towards the anode. DNA fragments move towards the anode according to their molecule size through the pores of agarose gel. Thus, the smaller fragments move farther away as compared to larger fragments. |
| Tools of Recombinant Technology: Gel Electrophoresis |

|  |
| --- |
| The linking of antibiotic resistance gene with the plasmid vector became possible with  2008 |
| DNA polymerase |
| exonucleases |
| DNA ligase |
| endonucleases |
| C |
| Transferase enzyme |
| The correct answer is DNA ligase; The construction of the first recombinant DNA emerged from the possibility of linking a gene encoding antibiotic resistance with a native plasmid. The cutting of DNA at specific locations became possible with the discovery of the so called 'molecular scissors' - restriction enzymes. The cut piece of DNA was then linked with the plasmid DNA. This plasmid DNA acts as vector to transfer the piece of DNA attached to it. The linking of antibiotic resistance gene with the plasmid vector became possible with the enzyme DNA ligase, which acts on cut DNA molecules and joins their ends. This makes a new combination of circular autonomously replicating DNA created in vitro and is known as recombinant DNA. |
| Tools of Recombinant Technology: Plasmids |

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| --- |
| Restriction endonuclease  2006 |
| synthesizes DNA |
| cuts the DNA molecule randomly |
| cuts the DNA molecule at specific sites |
| restricts the synthesis of DNA inside the nucleus |
| c |
| Molecular scissors |
| The correct answer is cuts the DNA at specific sites; Genetic engineering is possible because of special enzymes that cut DNA. These enzymes are called restriction enzymes or restriction endonucleases. Restriction enzymes are proteins produced by bacteria to prevent or restrict invasion by foreign DNA. They act as DNA scissors, cutting the foreign DNA into pieces so that it cannot function. These enzymes are routinely used for DNA modification in laboratories and are a vital tool in molecular cloning |
| Tools of Recombinant Technology: Restriction endonuclease |

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| --- |
| Two microbes found to be very useful in genetic engineering are  2006 |
| Crown gall bacterium and Caenorhabditis elegans |
| Escherichia coli and Agrobacterium tumefaciens |
| Vibrio cholerae and a tailed bacteriophage |
| Diplococcus sp. and Pseudomonas sp |
| b |
| Widely studied and used. |
| The correct answer is E.coli and Agrobacterium tumefaciens ; E.coli contains many important standard cloning vectors widely used in gene cloning experiments like pBR322 contains origin of replication (ori). Other cloning vectors like PACYC177, pBR324, contain ampicillin resistance gene are also found in E.coli. Among higher plants, Ti plasmid of Agrobacterium tumefaciens and Ri plasmid of A. rhizogenes is the best-known vector. T-DNA from Ti or Ri plasmid of Agrobacterium is considered to be a very potential vector for cloning experiments with higher plants |
| Vectors for cloning genes in plants and animals |

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| --- |
| Restriction endonucleases |
| are present in mammalian cells for degradation of DNA when the cell dies |
| are used in genetic engineering for ligating two DNA molecules |
| are used for in vitro DNA synthesis |
| are synthesized by bacteria as part of their defense mechanism |
| d |
| First line Defence |
| The correct answer is “ Synthesized by bacteria as part of their defense mechanism” Restriction endonucleasses are enzymes that digest double stranded DNA following recognition of specific nucleotide sequences. This is achieved by cleaving the two phosphodiester bonds, one within each strand of the DNA duplex. They are found in bacteria and their function in bacteria is to cut up any invading virus as a part of its defense mechanism, thus restricting the multiplication of viruses in the bacterial cell. Different species of bacteria produce different restriction endonucleases. |
| Tools of Recombinant Technology: Restriction endonuclease |

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| --- |
| The Ti plasmid, is often used for making transgenic plants. The plasmid is found in  2004 |
| Azotobacter |
| Rhizobium of the roots of leguminous plants |
| Agrobacterium |
| Yeast as a plasmid. |
| c |
| Leguminous |
| The correct answer is agrobacterium; It is a soil plant pathogenic bacterium that carries Ti plasmid. It can transfer a particular segment of the tumor-inducing (Ti) plasmid into the nucleus of infected cells. The transferred T-DNA is then integrated into the host genome and transcribed with it. This ability of Agrobacterium tumefaciens to transfer the T-DNA in the host genome is explored in genetic engineering to transfer the desired DNA segment of up 25kb, carrying the gene of the interest, into the genome of selected organisms |
| Introducing Recombinant DNA into the host cells |

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| --- |
| The most thoroughly studied of the known bacteria plant interactions is the  2004 |
| cyanobacterial symbiosis with some aquatic ferns |
| gall formation on certain angiosperms by Agrobacterium |
| nodulation of Sesbania stems by nitrogen fixing bacteria |
| plant growth stimulation by phosphate solubilising bacteria |
| b |
| Ti plasmid Bacteria |
| The correct answer is gall formation on certain angiosperms by agrobacterium. Agrobacterium tumefaciens is the causative agent of crown gall, an important disease of many commercial crops. This disease has come to be recognized in recent years as being caused by a DNA plasmid (Ti plasmid) carried by bacterium and transferred to the plant cells |
| Vectors of genes in plants and animals |

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| --- |
| Which one of the following bacteria has found extensive use in genetic engineering work in plants? |
| Clostridium septicum |
| Xanthomonas citri |
| Bacillus coagulens |
| Agrobacterium tumefaciens |
| d |
| Ti plamid/ T-DNA |
| The correct answer is Agrobacterium tumefaciens, which has been extensively used in genetic engineering experiments. It is the causative agent of crown gall, an important disease of many commercial crops. This disease has come to be recognized in recent years as being caused by a DNA plasmid (Ti plasmid) carried by bacterium and transferred to the plant cells. Following the discovery of the relationship between crown gall and the plasmid, this plasmid has come to be widely used in plant genetic engineering as a vector in order to inject a novel gene in host plant to form a transgenic plant. |
| Vectors of genes in plants and animals |

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| --- |
| Which of the following enzymes are used to join bits of DNA?  2002 |
| Ligase |
| Primase |
| DNA Polymerase |
| Endonuclease |
| a |
| Transferase enzyme |
| The correct answer is Ligases are used to join bits of DNA. Primase is an RNA polymerase, used to initiate DNA synthesis. DNA polymerase enzyme catalyses the synthesis of DNA. Endonuclease, causes the splicing of the intron carrying the coding sequence of the same endonuclease. |
| Tools of Recombinant Technology: Restriction enzymes |

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| A mutant strain of - Bacteriophage, R-II, fails to lyse the E. coli but when two strains R-IIX and R-IIY are mixed then they lyse the E. coli. What may be the possible reason?  2001 |
| Bacteriophage transforms in wild. |
| It is not mutated. |
| Both strains have similar cistrons. |
| Both strains have different cistrons. |
| d |
| Cistron positioning |
| The correct answer is Both strains have different cistrons; A mutant strain of -bacteriophage, RII, fails to lyse the E.coli but when two strains R-IIX and R-IIY are mixed then they lyse the E.coli because both strains have different cistrons |
| Vectors for cloning genes in plants and animals |

|  |
| --- |
| Which of the following cut the DNA from specific places?  2001 |
| E. coli restriction endonuclease I |
| Ligase |
| Exonuclease |
| Alkaline phosphate |
| a |
| Molecular scissors |
| The correct answer is E.coli restriction endonuclease I ; Genetic engineering is possible because of special enzymes that cut DNA. These enzymes are called restriction enzymes or restriction endonucleases. Restriction enzymes are proteins produced by bacteria to prevent or restrict invasion by foreign DNA. They act as DNA scissors, cutting the foreign DNA into pieces so that it cannot function. These enzymes are routinely used for DNA modification in laboratories and are a vital tool in molecular cloning |
| Process of Recombinant technology- Cutting of DNA at specific location |

|  |
| --- |
| Maximum number of bases in plasmids discovered so far  2001 |
| 50 kilo base |
| 500 kilo base |
| 5000 kilo base |
| 5 kilo base. |
| b |
| Size of the Plasmid |
| The correct answer is 500 Kilo base; A plasmid is a DNA molecule separate from the chromosomal DNA and capable of autonomous replication. In many cases, it is typically circular and double-stranded. It usually occurs in bacteria and is sometimes found in eukaryotic organisms. The size of plasmids varies from 1 to over 400 kilobase pairs ( ). There may be one copy, for large plasmids, to hundreds of copies of the same plasmid in a single cell. |
| Process of Recombinant technology- Isolation of genetic material |

|  |
| --- |
| Plasmid has been used as vector because  2000 |
| it is circular DNA which have capacity to join to eukaryotic DNA |
| it can move between prokaryotic and eukaryotic cells |
| both ends show replication |
| it has antibiotic resistance gene. |
| a |
| Size and Shape |
| The correct answer is “it is circular DNA which have capacity to join to eukaryotic DNA. A cloning vector is a small piece of DNA, taken from a virus, a plasmid, or the cell of a higher organism, that can be stably maintained in an organism, and into which a foreign DNA fragment can be inserted for cloning purposes. The plasmids most commonly used in recombinant DNA technology replicate in E. coli. Most plasmid vectors contain a drug-resistance gene that confers additional survival properties to the bacteria. The DNA to be cloned replaces any one of these genes. |
| Tools for Recombinant technology: Plasmids |

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| --- |
| The process of replication in plasmid DNA, other than initiation, is controlled by  1999 |
| mitochondrial gene |
| plasmid gene |
| bacterial gene |
| none of these. |
| c |
| Ori site and Replication |
| The correct answer is Bacterial gene; The DNA plasmid replicates in a semi-conservative manner. The initiation of replication is controlled by plasmid gene and elongation and termination are controlled by bacterial genes. |
| Tools for Recombinant technology: Plasmids |

|  |
| --- |
| Recombinant DNA is achieved by cleaving the pro-DNAs by  1998 |
| Ligase |
| Restriction endonuclease |
| Primase |
| Exonuclease |
| b |
| Molecular scissors |
| The correct answer is restriction endonuclease; Recombinant DNA is the product obtained after isolating a specific DNA segment and then inserting it into another DNA molecule at a desired position. Restriction endonucleases are the enzymes that digest DNA at specific sites to isolate a specific DNA segment. Thus they are required for producing recombinant DNA. |
| Tools of Recombinant Technology: Recombinant DNA |

|  |
| --- |
| Restriction endonucleases are  1998 |
| used for in vitro DNA synthesis |
| used in genetic engineering |
| synthesized by bacteria |
| present in mammalian cells for degradation of DNA. |
| b |
| Molecular scissors |
| The correct answer is used in genetic engineering; Recombinant DNA is the product obtained after isolating a specific DNA segment and then inserting it into another DNA molecule at a desired position. Restriction endonucleases are the enzymes that digest DNA at specific sites to isolate a specific DNA segment. Thus, they are required for producing recombinant DNA. |
| Tools of Recombinant Technology; Restriction endonuclease |

|  |
| --- |
| The restriction enzymes are used in genetic engineering, because  1995 |
| they can cut DNA at specific base sequence |
| they are nucleases that cut DNA at variable sites |
| they can degrade harmful proteins |
| they can join different DNA fragments. |
| a |
| Molecular scissors |
| The correct answer is they can cut at specific base sequence.Recombinant DNA is the product obtained after isolating a specific DNA segment and then inserting it into another DNA molecule at a desired position. Restriction endonucleases are the enzymes that digest DNA at specific sites to isolate a specific DNA segment. Thus they are required for producing recombinant DNA |
| Tools of Recombinant Technology: Restriction enzymes |

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| Which of the following is a correct sequence of steps in a PCR (Polymerase Chain Reaction)?  2021 |
| Annealing, Denaturation, Extension |
| Denaturation, Annealing, Extension |
| Denaturation, Extension, Annealing |
| Extension, Denaturation, Annealing |
| b |
| PCR- Steps |
| The correct answer is Denaturation, Annealing and Extension; A single PCR cycle involves three basic steps. Denaturation (DNA is heated to high temperature, usually ) Primer annealing (two oligonucleotide primers anneal to each of the single stranded template DNA, temperature usually ) and Extension (Taq DNA polymerase synthesises the DNA region between primers, optimum temperature ). |
| Amplification by PCR |

|  |
| --- |
| During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out  2021 |
| polysaccharides |
| RNA |
| DNA |
| Histones |
| c |
| Cold ethanol precipitates |
| The correct answer is DNA; Since the DNA is enclosed within the membranes, the cell has to be broken open to release DNA along with other macromolecules such as RNA, proteins, polysaccharides and also lipids. It is achieved by treating the bacterial cells/plant or animal tissue with enzymes, such as lysozyme for bacterial cells, cellulase for plant cells and chitinase for fungal cells. DNA is interwined with proteins such as histones which can be removed by treatment with proteases. The RNA can be removed by treatment with ribonuclease. |
| Amplification by PCR; Steps in PCR |

|  |
| --- |
| Which of the following is not an application of PCR (Polymerase Chain Reaction)?  2021 |
| Detection of gene mutation |
| Molecular diagnosis |
| Gene amplification |
| Purification of isolated protein |
| d |
| PCR- DNA |
| The correct answer is Purification of isolated protein; Purification of isolated protein is one of the step used in downstream processing of recombinant DNA technology. |
| Amplification by PCR:Steps in PCR |

|  |
| --- |
| During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first?  2021 |
| Ligation |
| Annealing |
| Extension |
| Denaturation |
| d |
| dsDNA to ss DNA |
| The correct answer is Denaturation ; In PCR, the repeated amplification is achieved by the use of a thermostable DNA polymerase, which remain active during the high temperature induced denaturation of double stranded DNA. So, if high temperature is not maintained, denaturation will be affected first as it is carried out at a higher temperature to . |
| Amplification by PCR; Denaturation |

|  |
| --- |
| DNA precipitation out of a mixture of biomolecules can be achieved by treatment with  2019 |
| Chilled chloroform |
| Isopropanol |
| Chilled ethanol |
| Methanol at room temperature |
| c |
| Cold ethanol precipitates |
| The correct answer is chilled ethanol; In order to cut the DNA with restriction enzymes, it needs to be in pure form, free from other macromolecules. since the DNA is enclosed by the membranes, we have to break the cell open to release DNA and other macromolecules like RNA, proteins, polysaccharides and lipids. It is obtained by treating the bacterial cells/plant or animal tissue with enzymes. Other molecules are removed by appropriate treatments and purified DNA ultimately precipitates out after the addition of chilled ethanol |
| Amplification by PCR: Steps in PCR |

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| --- |
| Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes?  2019 |
| Bioreactor |
| BDO Reactor |
| Sludge Reactor |
| Industrial oven |
| a |
| Fermentation -controlled operation |
| The correct answer is Bioreactor, to grow microbes on large scale, the controlled operations of fermentation broth is need ; which is termed as Bioreactor. |
| Obtaining the foreign gene product: Bioreactor |

|  |
| --- |
| The process of separation and purification of expressed protein before marketing is called  2017 |
| downstream processing |
| bioprocessing |
| postproduction processing |
| upstream processing. |
| a |
| Purification of final product. |
| The correct answer is down stream processing. After the formation of the product in the bioreactor it undergoes some processes before a finished product is ready for marketing. The process includes separation and purification of products which are collectively called downstream processing. |
| Downstream processing |

|  |
| --- |
| Stirred-tank bioreactors have been designed for  NEET II 2016 |
| purification of product |
| addition of preservatives to the product |
| availability of oxygen throughout the process |
| ensuring anaerobic conditions in the culture vessel. |
| c |
| Agitation -aeration |
| The correct answer is availability of oxygen throughout the process. A stirred-tank reactor is usually cylindrical or with a curved base to facilitate the mixing of the reactor contents. The stirrer facilitates, even mixing and oxygen availability throughout the bioreactor. |
| Obtaining the foreign gene product: Continuous culture system |

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| --- |
| Which of the following is not a component of downstream processing?  NEET II 2016 |
| Separation |
| Purification |
| Preservation |
| Expression |
| d |
| Final Product |
| The correct answer id Expression; After the formation of the product in bioreactor, it undergoes some processes before a finished product to be ready for marketing. Downstream processing includes separation and purification process. The product obtained is subjected to quality control, testing and kept in suitable preservatives. |
| Downstream Processing |

|  |
| --- |
| The Taq polymerase enzyme is obtained from  NEET I 2016 |
| Bacillus subtilis |
| Pseudomonas putida |
| Thermus aquaticus |
| Thiobacillus ferroxidans |
| C |
| Bacterium |
| The correct answer is Thermus aquaticus; Taq polymerase, generally used in PCR is isolated from thermophilic bacterium Thermus aquaticus. |
| Tools in Recombinant Technology: Restriction enzymes |

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| --- |
| An analysis of chromosomal DNA using the Southern hybridization technique does not use  2014 |
| electrophoresis |
| blotting |
| autoradiography |
| PCR |
| d |
| Amplification of DNA |
| The correct answer is PCR; PCR is used only for amplification of DNA. It is not directly involved in Southern hybridisation technique |
| Tools in Recombinant Technology:Gel electrophoresis |

|  |
| --- |
| In vitro clonal propagation in plants is characterized by  2014 |
| PCR and RAPD |
| Northern blotting |
| Electrophoresis and HPLC |
| Microscopy |
| a |
| Amplification and Detection |
| The correct answer is PCR and RAPD; Clonal propagation can be characterized by PCR and RAPD. The polymerase chain reaction (PCR) technique, generates microgram quantities of DNA copies (upto billion copies) of the desired DNA (or RNA) segment, present even as a single copy in the initial preparation, in a matter of few hours. RAPD stands for Random Amplification of Polymorphic DNA. It is a type of PCR, but the segments of DNA that are amplified are random. No knowledge of the DNA sequence for the targeted gene is required, as the primers will bind somewhere in the sequence, but it is not certain exactly where. Its resolving power is much lower than targeted, species specific DNA comparison methods, such as short tandem repeats. |
| Introducing recombinant DNA in the host cells |

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| Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?  2013 |
| Algae - Methylase |
| Fungi - Chitinase |
| Bacteria - Lysozyme |
| Plant cells - Cellulase |
| a |
| Fugal are rich in cellulose |
| The correct answer is Algae-Methylase; Cell wall of algae is made up of cellulose, pectin and mucilage. These substances cannot be degraded by methylase. Methylase is a type of transferase enzyme that transfers a methyl group from a donor to an acceptor. |
| Process of recombinant technology |

|  |
| --- |
| During the process of isolation of DNA, chilled ethanol is added to  KARNATAKA NEET 2013 |
| precipitate DNA |
| break open the cell to release DNA |
| facilitate action of restriction enzymes |
| Remove proteins such as histones. |
| a |
| Chilled ethanol -solvent |
| The correct answer is “precipitates DNA” Ethanol is much less polar than water. Adding it to the solution disrupts the screening charges exerted by water. The electrical attraction between phosphate and any positive ions present in solution becomes strong enough to form a stable ionic bond and DNA precipitates. Ethanol precipitation is a widely used technique to purify, or concentrate nucleic acid. |
| Tools for Recombinant Technology: Gel electrophoresis |

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| --- |
| PCR and restriction fragment length polymorphism are the methods for  2012 |
| study of enzymes |
| genetic transformation |
| DNA sequencing |
| genetic fingerprinting. |
| d |
| DNA Walking-Primer Walking |
| The correct answer is Genetic finger printing. PCR can be used in DNA fingerprinting as a way to make numerous copies of isolated DNA. The process can selectively amplify a single copy of a desired sequence. Restriction fragment length polymorphism is a method where variation in DNA between individuals is revealed by restriction enzymes. DNA is cut into fragments of different lengths in consequence of such variations. It is used forensically and in the diagnosis of hereditary disease. |
| Amplification by PCR |

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| --- |
| Which one is a true statement regarding DNA polymerase used in PCR?  2012 |
| It is used to ligate introduced DNA in recipient cells. |
| It serves as a selectable marker. |
| It is isolated from a virus. |
| It remains active at high temperature |
| d |
| PCR-at 92 C |
| The Correct answer is It remains active at high temperature; In PCR, Taq polymerase is used which is obtained from Thermus aquaticus bacteria. It is a relatively thermostable enzyme thus used in PCR as during the process the step involving denaturation of DNA strands requires high temperature. |
| Amplification by PCR: Annealing |