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# NEET BIOTECHNOLOGY: PRINCIPLES AND PROCESSES — TOOLS OF RECOMBINANT DNA TECHNOLOGY: RESTRICTION ENZYMES AND GEL ELECTROPHORESIS — PYQS

**Max. Marks:** 172 **Questions:** 43

## Section A (MCQ) — 43 questions

**Q.1** Which of the following statements are not true regarding restriction endonucleases?

A. They are called molecular scissors.
B. These are the enzymes responsible for restricting the growth of bacteriophages in *E. coli*.
C. They cut the DNA only at the centre of the palindromic sites.
D. They remove nucleotides only from the ends of DNA fragments.
E. They recognise specific palindromic base-pair sequences.

Choose the answer from the options given below : [NEET (UG) 2026]

(1) C and D only (2) A and E only
(3) D and E only (4) A and B only

Scan or tap for the full solution

**Q.2** Which of the following statements are correct with respect to DNA separation, isolation and visualization?

A. The cutting of DNA is done by molecular scissors.
B. The DNA fragments separate according to their size in an agarose gel, upon electrophoresis.
C. The separated DNA fragments can be seen without staining when exposed to UV light.
D. The separated DNA fragments, when stained with ethidium bromide, can be seen in visible light.

Choose the correct answer from the options given below : [NEET (UG) 2026]

(1) A and B only (2) B and D only
(3) A and D only (4) B and C only

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**Q.3** Which of the following enzyme(s) are NOT essential for gene cloning?

A. Restriction enzymes B. DNA ligase
C. DNA mutase D. DNA recombinase
E. DNA polymerase

Choose the correct answer from the options given below: [NEET (UG) 2025]

(1) D and E only (2) B and C only
(3) C and D only (4) A and B only

Scan or tap for the full solution

**Q.4** Given below are two statements:

**Statement-I:** The DNA fragments extracted from gel electrophoresis can be used in construction of recombinant DNA.

**Statement-II:** Smaller size DNA fragments are observed near anode while larger fragments are found near the wells in an agarose gel.

In the light of the above statements, choose the most appropriate answer from the options given below : [NEET (UG) 2025]

(1) Statement-I is correct but statement II is incorrect
(2) Statement-I is incorrect but statement II is correct
(3) Both statement I and statement II are correct
(4) Both statement I and statement II are incorrect

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**Q.5** Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of: [NEET (UG) 2024]

(1) 8 bp (2) 6 bp (3) 4 bp (4) 10 bp

Scan or tap for the full solution

**Q.6** Identify the incorrect statement related to gel electrophoresis. [RE-NEET (UG) 2024]

(1) Separated DNA fragments can be directly seen under UV radiation
(2) Separated DNA can be extracted from gel piece
(3) Fragment of DNA moves toward anode
(4) Sieving effect of agarose gel helps in separation of DNA fragments

Scan or tap for the full solution

**Q.7** Recombinant DNA molecule can be created normally by cutting the vector DNA and source DNA respectively with: [RE-NEET (UG) 2024]

(1) Hind II, Hind II (2) Hind II, Alu I
(3) Hind II, EcoR I (4) Hind II, BamHI

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**Q.8** Which of the following are correct about EcoRI?

A. Cut the DNA with blunt end
B. Cut the DNA with sticky end
C. Recognise a specific palindromic sequence
D. Cut the DNA between the base G and A when encounters the DNA sequence 'GAATTC'
E. Exonuclease

Choose the correct answer from the options given below: [RE-NEET (UG) 2024]

(1) B, C, E only (2) A, D, E only
(3) A, C, D only (4) B, C, D only

Scan or tap for the full solution

**Q.9** Upon exposure to UV radiation, DNA stained with ethidium bromide will show [NEET (UG) 2023]

(1) Bright blue colour
(2) Bright yellow colour
(3) Bright orange colour
(4) Bright red colour

Scan or tap for the full solution

**Q.10** Which one of the following statements is not true regarding gel electrophoresis technique? [NEET (UG) 2022]

(1) The process of extraction of separated DNA strands from gel is called elution.
(2) The separated DNA fragments are stained by using ethidium bromide.
(3) The presence of chromogenic substrate gives blue coloured DNA bands on the gel.
(4) Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.

Scan or tap for the full solution

**Q.11** In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme? [NEET (UG) 2022]

(1) 5'GATACT3' ; 3'CTATGA5'
(2) 5'GAATTC3' ; 3'CTTAAG5'
(3) 5'CTCAGT3' ; 3'GAGTCA5'
(4) 5'GTATTC3' ; 3'CATAAG5'

Scan or tap for the full solution

**Q.12** 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 : [NEET (UG) 2022]

(1) Both Statement-I and Statement-II are correct
(2) Both Statement-I and Statement-II are incorrect
(3) Statement-I is correct but Statement-II is incorrect
(4) Statement-I is incorrect but Statement-II is correct

Scan or tap for the full solution

**Q.13** Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

**Assertion (A):** When a particular restriction enzyme cuts strand of DNA, overhanging stretches or sticky ends are formed.

**Reason (R):** Some restriction enzymes cut the strand of DNA a little away from the centre of palindromic site.

In the light of the above statements, choose the correct answer from the options given below : [NEET (UG) 2022 (Phase 2)]

(1) (A) is not correct but (R) is correct
(2) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(4) (A) is correct but (R) is not correct

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**Q.14** Separation of DNA fragments is done by a technique known as [NEET (UG) 2022 (Phase 2)]

(1) Gel electrophoresis
(2) Polymerase Chain Reaction
(3) Recombinant technology
(4) Southern blotting

Scan or tap for the full solution

**Q.15** Refer to the following statements for agarose-gel electrophoresis:

A. Agarose is a natural polymer obtained from sea-weed.
B. The separation of DNA molecules in agarose-gel electrophoresis depends on the size of DNA.

C. The DNA migrates from negatively-charged electrode to the positively-charged electrode.
D. The DNA migrates from positively-charged electrode to the negatively-charged electrode.

Choose the most appropriate answer from the options given below : [NEET (UG) 2022 (Phase 2)]

(1) B, C and D only (2) A and B only
(3) A, B and C only (4) A, B and D only

Scan or tap for the full solution

**Q.16** DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear as [NEET (UG) 2021]

(1) Bright blue bands (2) Yellow bands
(3) Bright orange bands (4) Dark red bands

Scan or tap for the full solution

**Q.17** A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is : [NEET (UG) 2021]

(1) Poly (A) tail sequences
(2) Degenerate primer sequence
(3) Okazaki sequences
(4) Palindromic Nucleotide sequences

Scan or tap for the full solution

**Q.18** In gel electrophoresis, separated DNA fragments can be visualized with the help of [NEET (UG) 2020]

(1) Ethidium bromide in infrared radiation
(2) Ethidium bromide in UV radiation
(3) Acetocarmine in bright blue light
(4) Acetocarmine in UV radiation

Scan or tap for the full solution

**Q.19** Identify the wrong statement with regard to Restriction Enzymes [NEET (UG) 2020]

(1) Sticky ends can be joined by using DNA ligases.
(2) They cut the strand of DNA at palindromic sites.
(3) Each restriction enzyme functions by inspecting the length of a DNA sequence.
(4) They are useful in genetic engineering

Scan or tap for the full solution

**Q.20** The specific palindromic sequence which is recognized by EcoRI is [NEET (UG) 2020]

(1) 5′ - GGATCC - 3′
3′ - CCTAGG - 5′
(2) 5′ - GAATTC - 3′
3′ - CTTAAG - 5′
(3) 5′ - GGAACC - 3′
3′ - CCTTGG - 5′
(4) 5′ - CTTAAG - 3′
3′ - GAATTC - 5′

Scan or tap for the full solution

**Q.21** Choose the correct pair from the following [NEET (UG) 2020]

(1) Exonucleases – Make cuts at specific positions within DNA
(2) Ligases – Join the two DNA molecules
(3) Polymerases – Break the DNA into fragments
(4) Nucleases – Separate the two strands of DNA

Scan or tap for the full solution

**Q.22** Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the **incorrect** statement. [NEET (UG) 2019]

(1) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand
(2) The enzyme recognizes a specific palindromic nucleotide sequence in the DNA
(3) The enzyme cuts DNA molecule at identified position within the DNA
(4) The enzyme binds DNA at specific sites and cuts only one of the two strands

Scan or tap for the full solution

**Q.23** The DNA fragments separated on an agarose gel can be visualised after staining with [NEET 2017]

(1) Bromophenol blue (2) Aniline blue
(3) Ethidium bromide (4) Acetocarmine

Scan or tap for the full solution

**Q.24** DNA fragments are [NEET 2017]

(1) Positively charged
(2) Either positively or negatively charged depending on their size
(3) Neutral
(4) Negatively charged

Scan or tap for the full solution

**Q.25** What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis ? [NEET 2017]

(1) Positively charged fragments move to farther end
(2) Negatively charged fragments do not move
(3) The smaller the fragment size, the farther it moves
(4) The larger the fragment size, the farther it moves

Scan or tap for the full solution

**Q.26** Which of the following is a restriction endonuclease ? [NEET 2016 (Phase 1)]

(1) DNase I (2) Hind II
(3) RNase I (4) Protease

Scan or tap for the full solution

**Q.27** Which of the following restriction enzymes produces blunt ends ? [NEET 2016 (Phase 2)]

(1) Eco RV (2) Hind III
(3) Xho I (4) Sal I

Scan or tap for the full solution

**Q.28** The cutting of DNA at specific locations became possible with the discovery of - [AIPMT 2015]

(1) Restriction enzymes (2) Selectable markers
(3) Probes (4) Ligases

Scan or tap for the full solution

**Q.29** DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by : [NEET 2013]

(1) Polymerase chain reaction
(2) Restriction mapping
(3) Electrophoresis
(4) Centrifugation

Scan or tap for the full solution

**Q.30** Which one of the following represents a palindromic sequence in DNA ? [AIPMT 2012 (Mains)]

(1) 5′-GAATTC-3′
3′-CTTAAG-5′
(2) 5′-GATACC-3′
3′-CCTAAG-5′
(3) 5′-CCAATG-3′
3′-GAATCC-5′
(4) 5′-CATTAG-3′
3′-GATAAC-5′

Scan or tap for the full solution

**Q.31** 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'
3' ..... CTTAAG ..... 5'

[AIPMT 2011 (Prelims)]

(1) Start codon at the 5' end
(2) Replication completed
(3) Deletion mutation
(4) Palindromic sequence of base pairs

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**Q.32** There is a restriction endonuclease called EcoRI. What does "co" part in it stand for ? [AIPMT 2011 (Prelims)]

(1) colon (2) coelom
(3) coenzyme (4) coli

Scan or tap for the full solution

**Q.33** Agarose extracted from sea weeds finds use in : [AIPMT 2011 (Prelims)]

(1) Spectrophotometry (2) PCR
(3) Tissue Culture (4) Gel electrophoresis

Scan or tap for the full solution

**Q.34** Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme? [AIPMT 2010 (Prelims)]

(1) 5′ —— CGTTCG —— 3′
3′ —— ATGGTA —— 5′
(2) 5′ —— GAATTC —— 3′
3′ —— CTTAAG —— 5′
(3) 5′ —— CACGTA —— 3′
3′ —— CTCAGT —— 5′
(4) 5′ —— GATATG —— 3′
3′ —— CTACTA —— 5′

Scan or tap for the full solution

**Q.35** Restriction endonucleases are enzymes which – [AIPMT 2010 (Prelims)]

(1) recognize a specific nucleotide sequence for binding of DNA ligase
(2) remove nucleotides from the ends of the DNA molecule
(3) restrict the action of the enzyme DNA polymerase
(4) make cuts at specific positions within the DNA molecule

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**Q.36** Gel electrophoresis is used for: [AIPMT 2008]

(1) cutting of DNA into fragments

(2) separation of DNA fragments according to their size

(3) construction of recombinant DNA by joining with cloning vectors

(4) isolation of DNA molecule

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**Q.37** The linking of antibiotic resistance gene with the plasmid vector became possible with: [AIPMT 2008]

(1) Exonucleases (2) Endonucleases

(3) DNA ligase (4) DNA polymerase

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**Q.38** Restriction endonuclease - [AIPMT 2006]

(1) Cuts the DNA molecule at specific sites

(2) Synthesizes DNA

(3) Restricts the synthesis of DNA inside the nucleus

(4) Cuts the DNA molecule randomly

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**Q.39** Which one of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain? [AIPMT 2005]

(1) Protease (2) Endonuclease

(3) Lipase (4) Exonuclease

Scan or tap for the full solution

**Q.40** Restriction endonucleases :- [AIPMT 2004]

(1) Are used for in vitro DNA synthesis

(2) Are present in mammalian cells for degradation of DNA when the cell dies

(3) Are synthesized by bacteria as part of their defense mechanism

(4) Are used in genetic engineering for ligating two DNA molecules

Scan or tap for the full solution

**Q.41** Which of the following enzymes are used to join bits of DNA ? [AIPMT 2002]

(1) Endonuclease (2) DNA polymerase

(3) Ligase (4) Primase

Scan or tap for the full solution

**Q.42** Manipulation of DNA in genetic engineering became possible due to the discovery of : - [AIPMT 2002]

(1) Transcriptase

(2) DNA ligase

(3) Primase

(4) Restriction endonuclease

Scan or tap for the full solution

**Q.43** Which of the following cuts the DNA from specific places? [AIPMT 2001]

(1) Exonuclease

(2) Alkaline phosphatase

(3) *E. coli* restriction endonuclease I

(4) Ligase

Scan or tap for the full solution

## ANSWER KEY

| Ques. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ans.** | **1** | **1** | **3** | **3** | **2** | **1** | **1** | **4** | **3** | **3** | **2** |
| **Ques.** | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| **Ans.** | **1** | **2** | **1** | **3** | **3** | **4** | **2** | **3** | **2** | **2** | **4** |
| **Ques.** | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
| **Ans.** | **3** | **4** | **3** | **2** | **1** | **1** | **3** | **1** | **4** | **4** | **4** |
| **Ques.** | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | |
| **Ans.** | **2** | **4** | **2** | **3** | **1** | **2** | **3** | **3** | **4** | **3** | |