# Bihar Public Service Commission, Patna

## Advt. No. 33/2024, Mechanical Engineering - I, Paper - V

## Assistant Engineer, Mechanical Written (Objective) Competitive Examination

### Final Answer key (Set- A)

| Question No. | Ans. Key | Question No. | Ans. Key |
|---|---|---|---|
| 1 | C | 26 | C |
| 2 | C | 27 | C |
| 3 | D | 28 | C |
| 4 | D | 29 | C |
| 5 | B | 30 | C |
| 6 | A | 31 | B |
| 7 | D | 32 | D |
| 8 | D | 33 | A |
| 9 | C | 34 | A |
| 10 | B | 35 | Deleted |
| 11 | D | 36 | C |
| 12 | B | 37 | B |
| 13 | B | 38 | A |
| 14 | D | 39 | D |
| 15 | C | 40 | B |
| 16 | D | 41 | B |
| 17 | D | 42 | B |
| 18 | C | 43 | D |
| 19 | C | 44 | D |
| 20 | A | 45 | A |

| Question No. | Ans. Key | Question No. | Ans. Key |
|---|---|---|---|
| 21 | A | 46 | D |
| 22 | B | 47 | B |
| 23 | B | 48 | B |
| 24 | C | 49 | B |
| 25 | C | 50 | A |

| (Set - B) | | | |
|---|---|---|---|
| **Question No.** | **Ans. Key** | **Question No.** | **Ans. Key** |
| 1 | B | 26 | C |
| 2 | C | 27 | B |
| 3 | B | 28 | C |
| 4 | B | 29 | A |
| 5 | A | 30 | A |
| 6 | B | 31 | A |
| 7 | D | 32 | B |
| 8 | A | 33 | D |
| 9 | A | 34 | D |
| 10 | D | 35 | C |
| 11 | C | 36 | B |
| 12 | C | 37 | C |
| 13 | Deleted | 38 | C |
| 14 | A | 39 | D |
| 15 | D | 40 | C |
| 16 | D | 41 | D |
| 17 | C | 42 | A |
| 18 | B | 43 | B |
| 19 | B | 44 | C |
| 20 | D | 45 | A |
| 21 | C | 46 | A |
| 22 | A | 47 | B |
| 23 | A | 48 | C |
| 24 | C | 49 | B |
| 25 | C | 50 | C |

| | | | |
|---|---|---|---|
| **(Set - C)** | | | |
| **Question No.** | **Ans. Key** | **Question No.** | **Ans. Key** |
| 1 | D | 26 | B |
| 2 | C | 27 | D |
| 3 | D | 28 | C |
| 4 | A | 29 | B |
| 5 | A | 30 | D |
| 6 | C | 31 | B |
| 7 | A | 32 | A |
| 8 | C | 33 | D |
| 9 | A | 34 | C |
| 10 | C | 35 | A |
| 11 | B | 36 | C |
| 12 | D | 37 | D |
| 13 | B | 38 | A |
| 14 | D | 39 | C |
| 15 | B | 40 | C |
| 16 | C | 41 | A |
| 17 | C | 42 | C |
| 18 | B | 43 | C |
| 19 | A | 44 | B |
| 20 | A | 45 | A |
| 21 | B | 46 | D |
| 22 | B | 47 | A |
| 23 | B | 48 | C |
| 24 | B | 49 | Deleted |
| 25 | A | 50 | A |

| (Set - D) | | | |
|---|---|---|---|
| **Question No.** | **Ans. Key** | **Question No.** | **Ans. Key** |
| 1 | B | 26 | A |
| 2 | C | 27 | A |
| 3 | C | 28 | D |
| 4 | B | 29 | B |
| 5 | A | 30 | D |
| 6 | B | 31 | A |
| 7 | B | 32 | A |
| 8 | D | 33 | D |
| 9 | D | 34 | D |
| 10 | C | 35 | A |
| 11 | B | 36 | C |
| 12 | B | 37 | C |
| 13 | B | 38 | D |
| 14 | D | 39 | A |
| 15 | A | 40 | C |
| 16 | A | 41 | B |
| 17 | C | 42 | B |
| 18 | D | 43 | C |
| 19 | C | 44 | A |
| 20 | D | 45 | A |
| 21 | C | 46 | D |
| 22 | A | 47 | C |
| 23 | B | 48 | D |
| 24 | D | 49 | D |
| 25 | B | 50 | Deleted |

| Question sequence as per Set - A | | | | |
|---|---|---|---|---|
| Set-A | Set-B | | Set-C | Set-D |
| 15 | 19 | | 2 | 22 |
| 35 | 13 | | 49 | 50 |
| 36 | 18 | | 48 | 32 |
| 44 | 23 | | 29 | 6 |

## Reasons as per Set-A

Q. No.  15-        No Change.

Reason :-        $CH_4$ +    $2O_2$ =>                $CO2$ +$2H_2O$

16 Kg        64 Kg

2Kg        (64/16) x2 = 8Kg

For 2 Kg $CH_4$ requires 8 kg of $O_2$ for complete combustion.

Q. No.  35-        Deleted

Option (B) and (D) both are correct. From isenthalpic curve and inversion curve, Option (B) is correct. For liquification of gases under Joule-Kelvin expansion through throttle valve, Option 'D'

Reason :-        is correct. Ref. Thermal engineering by P.K.Nag, Six edition, page no. 437 & 647.

Q. No.  36-        No Change.

(COP ref.) rev. Carnot = $T_2$/ ($T_1$- $T_2$) COP decreases with

increase in temperature difference (T1- T2),

i.e. higher temperature has to be increased and lower

Reason :-        temperature has to be decreased.

Ref. Engineering thermodynamics by P.K.Nag, six edition, Page no. 629

Q. No.  44-        No Change.

Reason :-                Indicated Thermal efficiency (.3)  =        Pm LAN/(2 mf.CV)

Volumetric efficiency                = $V_a$/ $V_S$ = 0.9, $V_a$ =0.9 $V_s$

mf    =0.05 x 0.9 x $V_s$ = 0.045 $V_s$

Indicated Thermal efficiency (.3)= $P_m$ x $V_s$/(2 x 0.045 $V_s$ x 45 x 10^{6})

$P_m$  = 12.15 bar

Ref. I.C. Engines by V.Ganesan, fourth edition, Page no. 25.