

BPSC AE

Previous Year Paper

2022 Paper 4

Gen Engg Science

Question Booklet



Paper—IV

GENERAL ENGINEERING SCIENCE

Time Allowed : 1 Hour

(Objective)

Maximum Marks : 100

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Question Booklet contains **50** questions in all.
2. **All** questions carry equal marks.
3. Attempt all questions.
4. **Immediately after commencement of the examination, you should check up your Question Booklet and ensure that the Question Booklet Series is printed on the top right-hand corner of the Booklet. The Booklet contains 7 printed pages and no page or question is missing or unprinted or torn or repeated. If you find any defect in this booklet, get it replaced immediately by a complete booklet of the same series.**
5. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. **You must write your Name, Roll No. and other particulars on the first page of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.**
7. You will encode your Roll Number and the Question Booklet Series A, B, C or D as it is printed on the top right-hand corner of this Question Booklet with Black/Blue ballpoint pen in the space provided on Page-2 of your Answer Sheet. **If you do not encode or fail to encode the correct series of your Question Booklet, your Answer Sheet will not be evaluated correctly.**
8. Questions and their responses are printed in English only in this Booklet. Each question comprises **four** responses—(A), (B), (C) and (D). You are to select **ONLY ONE** correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
9. In the Answer Sheet, there are **four** brackets—(A), (B), (C) and (D) against each question. To answer the questions you are to **mark with Black/Blue ballpoint pen ONLY ONE** bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. **If you mark more than one answer for one question, the answer will be treated as wrong. Any erasure or change is not allowed.**
10. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. **After the examination has concluded, you must hand over your Answer Sheet to the Invigilator.** Thereafter, you are permitted to take away the Question Booklet with you.
11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL

1. The first law of thermodynamics is law of
 - (A) conservation of energy
 - (B) conservation of mass
 - (C) conservation of heat
 - (D) conservation of work
2. If radiant energy E_B emitted by the black surface strikes the non-black surface and if non-black surface has absorptivity α , then it will absorb how much radiations?
 - (A) αE_B
 - (B) $2\alpha E_B$
 - (C) $3\alpha E_B$
 - (D) $4\alpha E_B$

$\epsilon = \frac{E}{E_b}$
3. Otto cycle is the air-standard cycle of
 - (A) spark ignition (SI) engine
 - (B) compression ignition (CI) engine
 - (C) both SI and CI engines
 - (D) None of the above
4. How is the heat added in the Diesel cycle?
 - (A) Reversibly at constant pressure
 - (B) Irreversibly at constant pressure
 - (C) Reversibly at constant volume
 - (D) Irreversibly at constant volume
5. Which type of turbine is a Francis turbine?
 - (A) Reaction turbine
 - (B) Impulse turbine
 - (C) Screw turbine
 - (D) None of the above
6. Centrifugal pumps transfer energy from
 - (A) rotor to fluid
 - (B) fluid to rotor
 - (C) draft to rotor
 - (D) rotor to draft
7. Centrifugal pumps are used to transport
 - (A) pressure
 - (B) speed
 - (C) power
 - (D) fluid
8. In centrifugal pump, the rotational kinetic energy comes from
 - (A) casing
 - (B) tank
 - (C) engine motor
 - (D) draft tube
9. In superposition theorem, when we consider the effect of one current source, all the other current sources are
 - (A) shorted
 - (B) opened
 - (C) removed
 - (D) undisturbed

(current - open voltage - shorted)
10. In inductive circuit, when inductance (L) or inductive reactance (X_L) increases, the circuit current
 - (A) also increases
 - (B) decreases
 - (C) remains same
 - (D) None of the above

$$P = IV \cos \phi$$

11. In pure inductive circuit, the power is
 (A) infinite
 (B) maximum
 (C) normal
 (D) zero ✓
12. The relationship between impedance (Z) and admittance (Y) is
 (A) $Z = 1/Y$
 (B) $Z = 1+Y$
 (C) $Z = 1-Y$
 (D) $Z = Y^2$
13. The magnetic effect of current was discovered by
 (A) Maxwell
 (B) Fleming
 (C) Oersted ✓
 (D) Faraday
14. The magnetic field lines
 (A) intersect at right angles to one another
 (B) intersect at an angle of 45° to each other
 (C) do not cross one another
 (D) cross at an angle of 60°
15. Alternative current generator is basically based upon
 (A) Ampere's law
 (B) Lenz's law
 (C) Faraday's law ✓
 (D) Coulomb's law
16. The armature of DC machine is made up of laminated sheets to
 (A) reduce the hysteresis loss
 (B) reduce the eddy-current loss ✓
 (C) reduce the armature copper loss
 (D) increase dissipation of heat from the armature surface
17. The major photochemical smog is
 (A) hydrogen peroxide
 (B) chlorofluorocarbon ✓
 (C) peroxyacetyl nitrate
 (D) All of the above
18. How many different types of primary pollutants together contribute to about 90 percent of the global air pollution?
 (A) Three
 (B) Five ✓
 (C) Seven
 (D) None of the above
19. BOD stands for
 (A) Biochemical Oxygen Demand ✓
 (B) British Columbia
 (C) British Columbia
 (D) Biological
20. The purest form of naturally occurring water is
 (A) rainwater ✓
 (B) river water
 (C) pond water
 (D) well water

21. In order to determine the effects of force, acting on body, we must know

- (A) magnitude of the force
- (B) line of action of the force
- (C) nature of the force, i.e., whether the force is push or pull
- (D) All of the above

22. Concurrent forces are those forces whose lines of action

- (A) lie on the same line
- (B) meet at one point
- (C) meet on the same plane
- (D) None of the above

23. A body starts to slide over a horizontal surface with an initial velocity of 0.2 m/s. Due to friction, its velocity decreases at the rate of 0.02 m/s. How much time will it take for the body to stop?

- (A) 10 s
- (B) 15 s
- (C) 1 s
- (D) 5 s

Which of the following do **not** have identical dimensions?

- (A) Momentum and impulse
- (B) Torque and energy
- (C) Kinetic energy and potential energy
- (D) Moment of a force and angular momentum

25. The total strain energy stored in a body is termed as

- (A) resilience
- (B) proof resilience
- (C) impact energy
- (D) modulus of resilience

26. Which of the following is **not** a surveying equipment?

- (A) Theodolite
- (B) Pitot tube
- (C) Level
- (D) Clinometer

27. The disc of supply energy meter is made of which material?

- (A) Zinc
- (B) Copper
- (C) Aluminium
- (D) Silver

28. Which of the following options is true for given statements for flatness testing?

Statement-1 :

Strain to c

Statement

Sing

can be used to determine flatness of the surface.

- (A) True, True
- (B) False, False
- (C) True, False
- (D) False, True

29. The supply to the megger is given by

- (A) AC motor
- (B) AC generator
- (C) permanent magnet DC motor
- (D) DC generator

30. Which of the following is a proper sequence?

- (A) Proportional limit, elastic limit, yielding, failure
- (B) Elastic limit, proportional limit, yielding, failure
- (C) Yielding, proportional limit, elastic limit, failure
- (D) None of the above

31. In symmetrical beam sections, the maximum shear stress is in the

- (A) top extreme fiber
- (B) centroid axis fiber
- (C) bottommost fiber
- (D) None of the above

maximum shear stress is equal to _____ of the Mohr's circle.

- (A) radius
- (B) diameter
- (C) circumference
- (D) area

33. The stress induced in a body, when suddenly loaded, is _____ the stress induced when the same load is applied gradually.

- (A) equal to
- (B) one-half
- (C) twice
- (D) four times

34. The effective length of a column of length L fixed against rotation and translation at one end and free at the other end is

- (A) $0.5L$
- (B) $0.7L$
- (C) $1.414L$
- (D) $2L$

$$S = \frac{L}{k}$$

35. Slenderness ratio is the ratio of effective length of column and

- (A) lateral dimension of a column
- (B) least radius of gyration of a column
- (C) maximum radius of gyration of a column
- (D) None of the above

36. Lime has _____ classified into how many types?

- (A) 4
- (B) 2
- (C) 5
- (D) 3

37. Which of the following is the lightest among the following?

- (A) Magnesium
- (B) Aluminium
- (C) Titanium
- (D) Copper

38. Which of the following metals is highly prone to corrosion?

- (A) Aluminium
- (B) Copper
- (C) Iron
- (D) Zinc ✓

39. Steel with _____ carbon is known as hypoeutectoid steel.

- (A) 0.8%
- (B) below 0.8%
- (C) above 0.8%
- (D) None of the above

_____ the particular task performance CPM is known as

- (A) dummy
- (B) event
- (C) activity
- (D) contract

41. Which of the following is an important factor that can affect the accuracy and efficacy of estimates?

- (A) Project size
- (B) Planning process
- (C) Project complexity
- (D) Degree of structural uncertainty

42. The critical path

- (A) is a path that operates from the starting node to the end node
- (B) is a mixture of all paths
- (C) is the longest path
- (D) is the shortest path

43. A/An _____ is an oldest type of machine which removes earth.

- (A) escalator
- (B) excavator
- (C) elevator
- (D) bulldozer

44. While scheduling CPM

- (A) a project network of various activities
- (B) required time for each activity is established
- (C) a sequence of various activities is made according to their importance
- (D) All of the above

45. The friction factor for laminar flow is given by

- (A) $(Re/64)$
- (B) $(64/Re)$
- (C) $(Re/16)$
- (D) $(16/Re)$

46. The flow of fluid will be laminar when

- $\frac{64}{Re}$
 $\frac{64}{Re}$
- (A) Reynolds' number is less than 2000
 - (B) the density of the fluid is low
 - (C) Both (A) and (B)
 - (D) None of the above

47. Which of the following sentences are true for Bernoulli's equation?

- (1) Bernoulli's principle is applicable to ideal incompressible fluid.
- (2) The gravity force and pressure forces are only considered in Bernoulli's principle.

The flow of fluid is rotational for Bernoulli's principle.

- (4) The heat transfer into or out of fluid should be zero to apply Bernoulli's principle.

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

48. Mohr's circle is used to determine the stresses on an oblique section of a body subjected to

- (A) direct tensile stress in one plane accompanied by a shear stress
- (B) direct tensile stress in two mutually perpendicular directions
- (C) direct tensile stress in two mutually perpendicular directions accompanied by a simple shear stress
- (D) All of the above

49. The emissive power of gray body is

- (A) less than the emissive power of the blackbody
- (B) greater than the emissive power of the blackbody
- (C) equal to the emissive power of the blackbody
- (D) Cannot

50. The absorptivity equals to

- (A) 2
- (B) 1
- (C) 3
- (D) 4
