

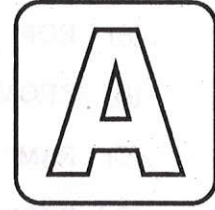
DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Test Booklet No. :

Series

01849

**TEST BOOKLET**  
**Paper—II**  
**( MECHANICAL ENGINEERING )**



Time Allowed : 2 Hours

Full Marks : 100

*Read the following instructions carefully before you begin to answer the questions :*

1. The name of the Subject, Roll Number as mentioned in the Admission Certificate, Test Booklet No. and Series are to be written legibly and correctly in the space provided on the Answer-Sheet with Black/Blue ballpoint pen.
2. **Answer-Sheet without marking Series as mentioned above in the space provided for in the Answer-Sheet shall not be evaluated.**
3. All questions carry equal marks.

**The Answer-Sheet should be submitted to the Invigilator.**

*Directions for giving the answers :* Directions for answering questions have already been issued to the respective candidates in the 'Instructions for marking in the OMR Answer-Sheet' along with the Admit Card and Specimen Copy of the OMR Answer-Sheet.

*Example :*

Suppose the following question is asked :

The capital of Bangladesh is

- (A) Chennai
- (B) London
- (C) Dhaka
- (D) Dhubri

You will have four alternatives in the Answer-Sheet for your response corresponding to each question of the Test Booklet as below :



In the above illustration, if your chosen response is alternative (C), i.e., Dhaka, then the same should be marked on the Answer-Sheet by blackening the relevant circle with a Black/Blue ballpoint pen only as below :



**The example shown above is the only correct method of answering.**

4. Use of eraser, blade, chemical whitener fluid to rectify any response is prohibited.
5. Please ensure that the Test Booklet has the required number of pages (16) and 100 questions immediately after opening the Booklet. In case of any discrepancy, please report the same to the Invigilator.
6. No candidate shall be admitted to the Examination Hall/Room 20 minutes after the commencement of the examination.
7. No candidate shall leave the Examination Hall/Room without prior permission of the Supervisor/Invigilator. No candidate shall be permitted to hand over his/her Answer-Sheet and leave the Examination Hall/Room before expiry of the full time allotted for each paper.
8. No Mobile Phone, Electronic Communication Device, etc., are allowed to be carried inside the Examination Hall/Room by the candidates. Any Mobile Phone, Electronic Communication Device, etc., found in possession of the candidate inside the Examination Hall/Room, even if on off mode, shall be liable for confiscation.
9. No candidate shall have in his/her possession inside the Examination Hall/Room any book, notebook or loose paper, except his/her Admission Certificate and other connected papers permitted by the Commission.
10. Complete silence must be observed in the Examination Hall/Room. No candidate shall copy from the paper of any other candidate, or permit his/her own paper to be copied, or give, or attempt to give, or obtain, or attempt to obtain irregular assistance of any kind.
11. This Test Booklet can be carried with you after answering the questions in the prescribed Answer-Sheet.
12. Noncompliance with any of the above instructions will render a candidate liable to penalty as may be deemed fit.
13. No rough work is to be done on the OMR Answer-Sheet. You can do the rough work on the space provided in the Test Booklet.

**N.B. : There will be negative marking @ 0.25 per 1 (one) mark against each wrong answer.**

/4-A

[ No. of Questions : 100 ]

SEAL

1. Which of the following allows simultaneous write and read operation in a computer?
  - (A) ROM
  - (B) EROM
  - (C) RAM
  - (D) EEPROM
2. What is the term for the data communication system within a building or campus?
  - (A) MAN
  - (B) WAN
  - (C) PAN
  - (D) LAN
3. MS-Word is an example of
  - (A) an operating system
  - (B) a processing device
  - (C) an application software
  - (D) an output device
4. A/An \_\_\_\_\_ is a central server on a computer network that enables connected clients to access the server's storage capacities.
  - (A) web server
  - (B) application server
  - (C) print server
  - (D) file server
5. In hexadecimal system, 10 is represented by
  - (A) E
  - (B) F
  - (C) G
  - (D) None of the above
6. Demand for commodity is more due to price fall is a situation of
  - (A) increase in demand
  - (B) contraction of demand
  - (C) decrease in demand
  - (D) extension of demand
7. Which one of the following is **not** a factor of production?
  - (A) Land
  - (B) Labour
  - (C) Motivation
  - (D) Capital
8. Out of the following, which is **not** a measure of sustainable water management?
  - (A) Preventing leakage from dam and canals
  - (B) Reducing the rate of surface runoff water
  - (C) Preventing loss in the municipal waste
  - (D) Building several small reservoirs instead of few mega projects



9. Which element is building block of both animal and plant tissues?
- (A) Sulphur  
(B) Carbon  
(C) Nitrogen  
(D) None of the above
10. The study of interaction between living and non-living organisms and environment is
- (A) ecology  
(B) ecosystem  
(C) phytosociology  
(D) phytogeography
11. The ultraviolet radiation in the stratosphere is absorbed by
- (A) carbon dioxide  
(B) sulphur dioxide  
(C) oxygen  
(D) ozone
12. Noise pollution causes
- (A) paralysis  
(B) blurred vision  
(C) anxiety and hypertension  
(D) failure of breathing
13. The primary greenhouse gas is
- (A) water vapour  
(B)  $N_2O$   
(C)  $CH_4$   
(D)  $CO_2$
14. Which of the following is a semi-conductor material?
- (A) Gold  
(B) Iron  
(C) Copper  
(D) Silicon
15. The principle of operation of a transformer is based on
- (A) Ampere's law  
(B) Faraday's law of electromagnetic induction  
(C) conservation of momentum  
(D) Coulomb's law
16. The metacentric height is the distance between the
- (A) centre of gravity of the floating body and centre of buoyancy  
(B) centre of gravity of the floating body and the metacentre  
(C) metacentre and centre of buoyancy  
(D) centre of gravity of the floating body and the centre of pressure

17. An ideal flow of any fluid must fulfil which of the following?
- (A) Pascal's law
  - (B) Newton's law of viscosity
  - (C) Bernoulli's theorem
  - (D) Continuity equation
18. Hydraulic ram is a device used
- (A) to accelerate the water flow
  - (B) to lift water without electric motor
  - (C) for lifting heavy load
  - (D) to beat water and lift it
19. 1 bar is equal to
- (A)  $10^5 \text{ N/m}^2$
  - (B)  $0.1 \text{ MN/m}^2$
  - (C)  $100 \text{ kN/m}^2$
  - (D) All of the above
20. Power required to drive the centrifugal pump is directly proportional to its \_\_\_\_\_ of its impeller.
- (A) diameter
  - (B) square of diameter
  - (C) cube of diameter
  - (D) fourth power of diameter
21. A channel is said to be most economical cross-section if
- (A) it gives maximum discharge for a given cross-sectional area and bed slope
  - (B) it has maximum wetted perimeter
  - (C) it involves lesser excavation for the designed channel
  - (D) All of the above
22. In machining, the zone where maximum heat is generated due to plastic deformation is called
- (A) shear zone
  - (B) friction zone
  - (C) work-tool contact zone
  - (D) None of the above
23. In Taylor's tool life equation  $VT^n = C$ ,  $V$  and  $T$  respectively represents
- (A) cutting speed and temperature
  - (B) cutting speed and tool life
  - (C) volume and temperature
  - (D) volume and tool life
24. Which of the following tools is manufactured by powder metallurgy?
- (A) Low carbon steel
  - (B) High carbon steel
  - (C) High speed steel
  - (D) Carbide tools



25. How many atoms are there in unit cell of a b.c.c. space lattice?
- (A) 6  
(B) 9  
(C) 14  
(D) 17
26. The steel used for motor car crankshafts is
- (A) nickel steel  
(B) chrome steel  
(C) nickel-chrome steel  
(D) silicon steel
27. The trade name of non-ferrous cast alloy composed of cobalt, chromium and tungsten is called
- (A) ceramic  
(B) stellite  
(C) diamond  
(D) cemented carbide
28. The first law of thermodynamics furnishes the relationship between
- (A) various thermodynamic processes  
(B) various properties of steam  
(C) heat, work and the properties of steam  
(D) heat and work
29. Enthalpy is calculated as the
- (A) sum of internal energy and product of pressure and volume of the system  
(B) sum of internal energy and product of pressure and density of the system  
(C) difference between internal energy and product of pressure and density  
(D) difference between internal energy and product of pressure and volume of the system
30. The relation between  $C_P$  and  $C_V$  (with usual notation) is
- (A)  $C_P - C_V = R$   
(B)  $\frac{C_P}{C_V} = \gamma$   
(C)  $C_P - C_V = \frac{R}{J}$   
(D) All of the above
31. The isothermal process of a system follows which law?
- (A) Charle's law  
(B) Boyle's law  
(C) Gay-Lussac law  
(D) All of the above

32. If heat  $Q$  flows reversibly from the system to the surroundings at ' $T_0$ ', what will be the effect on entropy?
- (A) Entropy of the system is reduced by  $\frac{Q}{T_0}$
- (B) System has lost entropy to the surroundings
- (C) Entropy increases to the surroundings is  $\frac{Q}{T_0}$
- (D) All of the above
33. A self-locking simple machine has
- (A) efficiency = 100%
- (B) efficiency = 50%
- (C) efficiency > 50%
- (D) efficiency < 50%
34. When a body of mass  $m$  attains a velocity  $v$  from rest in time  $t$ , then the kinetic energy of translation is
- (A)  $mv^2$
- (B)  $0.5 mv^2$
- (C)  $0.67 mv^2$
- (D) All of the above
35. If three coplanar like parallel forces acting on a beam having the magnitude 2 N, 1 kgf, 4 N, the resultant of these forces shall be ( $g = 10 \text{ m/s}^2$ )
- (A) 7 N
- (B) 6 N
- (C) 16 N
- (D) All of the above
36. The angle of banking on a circular path of a road is provided so that the resultant of the centrifugal force and weight of car fall
- (A) at an angle more than  $90^\circ$
- (B) at an angle less than  $90^\circ$
- (C) at an angle  $90^\circ$
- (D) None of the above
37. In a gas turbine cycle with regeneration
- (A) pressure ratio increases
- (B) work output decreases
- (C) thermal efficiency increases
- (D) heat input increases
38. In a diesel engine, heat addition takes place
- (A) at constant pressure
- (B) at constant volume
- (C) isothermally
- (D) adiabatically
39. Which of the following events would reduce the volumetric efficiency of a vertical compression (CI) engine?
- (A) Exhaust valve closing after TDC
- (B) Inlet valve closing after BDC
- (C) Inlet valve closing before BDC
- (D) Inlet valve opening before TDC



40. In a two-stroke petrol engine suction stroke volume found to be  $20 \text{ m}^3$  and clearance volume is  $4 \text{ m}^3$ . The compression ratio will be
- (A) 5
  - (B) 6
  - (C) 1.2
  - (D) None of the above
41. The COP of a domestic refrigerator
- (A) is less than 1
  - (B) is equal to 1
  - (C) is more than 1
  - (D) depends upon the weather condition
42. The vapour compression refrigerator employs which of the following cycles?
- (A) Reversed Rankine
  - (B) Carnot
  - (C) Reversed Carnot
  - (D) Rankine
43. The process of augmenting the engine power by raising the pressure of charge fed into the engine cylinder is called
- (A) scavenging
  - (B) supercharging
  - (C) pumping
  - (D) doping
44. In ammonia water vapour absorption refrigeration system
- (A) ammonia is absorbent and water is refrigerant
  - (B) ammonia is refrigerant and water is absorbent
  - (C) both ammonia and water are refrigerant
  - (D) both ammonia and water are absorbent
45. Heat treatment operation involving heating of steel above upper critical temperature and cooling it in air is known as
- (A) normalising
  - (B) tempering
  - (C) annealing
  - (D) stress relieving
46. Mild steel belongs to which of the following categories?
- (A) High carbon steel
  - (B) Medium carbon steel
  - (C) Low carbon steel
  - (D) Alloy steel
47. Solder is an alloy consisting of
- (A) lead and tin
  - (B) tin and copper
  - (C) lead and copper
  - (D) lead and zinc

48. Steel is primarily designated according to
- (A) alloying elements
  - (B) carbon content
  - (C) iron content
  - (D) tensile strength
49. The cutting tool on a milling machine is mounted on
- (A) arbor
  - (B) spindle
  - (C) column
  - (D) knee
50. Which of the following screw threads is adopted for power transmission in either direction?
- (A) ACME thread
  - (B) Square thread
  - (C) Buttress thread
  - (D) Multiple thread
51. An Allen bolt
- (A) is self-locking bolt
  - (B) is provided with countersunk head
  - (C) has a hexagonal depression in its head
  - (D) has both ends threaded
52. Which key is provided in pairs at right angles and each key withstands torsion in one-direction only?
- (A) Sunk key
  - (B) Flat saddle key
  - (C) Tangent key
  - (D) Hollow saddle key
53. Identify the bearing in which one end of the shaft rests within the bearing.
- (A) Footstep or pivot bearing
  - (B) Collar bearing
  - (C) Bush bearing
  - (D) Journal bearing
54. In third angle orthographic projection, the front view lies
- (A) below reference axis
  - (B) above ground level
  - (C) between reference axis and ground level
  - (D) All of the above
55. In a shaper
- (A) tool is stationary and work reciprocates
  - (B) tool moves over the stationary work
  - (C) tool moves over the reciprocating work
  - (D) work is stationary and tool reciprocates



56. In planer machine, the work that is supported on the table \_\_\_\_\_ against the stationary cutting tool.

- (A) oscillates
- (B) vibrates
- (C) reciprocates
- (D) Both (A) and (C)

57. Which of the following methods is usually used to weld gray cast iron?

- (A) TIG welding
- (B) MIG welding
- (C) Gas welding
- (D) Arc welding

58. Flank wear occurs mainly on

- (A) cutting edge
- (B) nose part and top face
- (C) face of the cutting tool at a short distance from the cutting edge
- (D) nose part, front relief face and side relief face of the cutting tool

59. Which of the following aspects pertains to climb milling during machining operation?

- (A) Gradual increase in chip thickness
- (B) Enable the cutter to dig in and start the cut
- (C) Reduce specific power consumption
- (D) Better surface finish

60. Removal of metal in a drilling operation is by

- (A) shearing
- (B) compression
- (C) extrusion
- (D) shearing and extrusion

61. Poisson's ratio is defined as the ratio of

- (A) lateral stress and longitudinal stress
- (B) longitudinal stress and longitudinal strain
- (C) longitudinal stress and lateral stress
- (D) lateral stress and lateral strain

62. In the Euler's formula for buckling load  $P_E = n \frac{\pi^2 EI}{l^2}$ , the value of  $n$  is least in case of column with condition

- (A) both ends are fixed
- (B) one end is fixed and other end is free
- (C) one end is fixed and other end is hinged
- (D) both ends are hinged

- 63.** A column whose slenderness ratio is less than 80 is
- (A) long column
  - (B) medium column
  - (C) short column
  - (D) weak column
- 64.** The maximum strain energy that can be stored in a body is known as
- (A) impact energy
  - (B) resilience
  - (C) proof resilience
  - (D) modulus of resilience
- 65.** The property of a fluid which enables it to resist tensile stress is known as
- (A) compressibility
  - (B) surface tension
  - (C) cohesion
  - (D) adhesion
- 66.** The function of a Governor is to
- (A) store energy and give up whenever required
  - (B) adjust variation of speed by varying the input to the engine
  - (C) decrease variation of speed
  - (D) increase variation of speed
- 67.** Coriolis component of acceleration exists whenever a point moves along a path that has
- (A) linear motion
  - (B) tangential acceleration
  - (C) rotational motion
  - (D) centripetal acceleration
- 68.** Inversion of a kinematic chain
- (A) modifies relative motion of one link relative to another
  - (B) completely changes the motion of links relative to each other
  - (C) keeps relative motion of the link unchanged with respect to one another
  - (D) has no effect on absolute motion of links
- 69.** The type of pair formed by two elements which are so connected that one is constrained to turn or revolve about a fixed axis of another element is known as
- (A) turning pair
  - (B) rolling pair
  - (C) sliding pair
  - (D) spherical pair



70. In the impulse turbine, the steam expands
- (A) in the nozzle
  - (B) in the blades
  - (C) partly in nozzle and partly in blades
  - (D) neither in nozzle nor in blades
71. Heat is transferred by all three modes viz., conduction, convection and radiation in
- (A) electric heater
  - (B) boiler
  - (C) steam condenser
  - (D) melting of ice
72. The economizer is used in boilers to
- (A) use more fuel
  - (B) increase flue gas temperature
  - (C) heat feed water by bleeding steam
  - (D) increase thermal efficiency of boiler
73. Which is the basic raw material of the nuclear plant?
- (A) Uranium
  - (B) Thorium
  - (C) Radium
  - (D) Plutonium
74. Honing operation is used to
- (A) harden a surface
  - (B) finish holes
  - (C) provide a very close fit between two contact surfaces
  - (D) remove the grinding and tools marks left by previous operation
75. Which of the following wage incentive plans guarantees minimum wage to a worker and bonus paid for the fixed percentage of time saved?
- (A) Halsey plan
  - (B) Gantt plan
  - (C) Rowan plan
  - (D) Emerson's efficiency plan
76. Which of the following charts gives simultaneous information about progress of work and machine?
- (A) Process chart
  - (B) Machine load chart
  - (C) Man-machine chart
  - (D) Gantt chart
77. PERT requires
- (A) single time estimate
  - (B) double time estimate
  - (C) triple time estimate
  - (D) None of the above

78. In manufacturing management, the term 'despatching' is used to describe

- (A) dispatch of sales order
- (B) dispatch of factory mail
- (C) dispatch of finished product of the user
- (D) dispatch of work orders through shop floor

79. Work study is concerned with

- (A) improving present method and finding standard time
- (B) motivation of workers
- (C) improving production capability
- (D) improving production, planning and control

80. The Rateau turbine belongs to the category of

- (A) pressure compounded turbine
- (B) reaction turbine
- (C) velocity compounded turbine
- (D) radial flow turbine

81. Blades of gas turbine are generally made of

- (A) aluminium
- (B) cast iron
- (C) cast steel
- (D) nickel-cobalt alloy

82. The process of producing energy by utilizing heat trapped inside earth surface is called

- (A) hydrothermal energy
- (B) geothermal energy
- (C) solar energy
- (D) wave energy

83. When solar radiation falls on the earth's surface, the temperature of

- (A) land mass rises faster than water mass
- (B) land mass rises slower than water mass
- (C) land mass and water mass rise uniformly
- (D) only land mass increases and water mass remains at fixed temperature

84. Bio-diesel is

- (A) obtained from fermentation of sugar
- (B) obtained from pyrolysis process
- (C) exudates of plants
- (D) an upgraded vegetable oil

85. The function of differential gear in an automobile is to

- (A) facilitate reverse operation of the vehicle
- (B) reduce tyre wear at high speed
- (C) distribute equal torque between wheels
- (D) take care of difference of speed of real wheels



86. The object of suspension system is to

- (A) prevent the road shock from being transmitted to the vehicle components
- (B) safeguard the occupants from the road shocks
- (C) preserve the stability of the vehicle in pitching or rolling while in motion
- (D) All of the above

87. In IC engine, the power developed inside the cylinder is known as

- (A) brake horsepower
- (B) frictional horsepower
- (C) indicated horsepower
- (D) pumping power

88. Human Resource Management (HRM) aims to maximise employees' as well as organization's

- (A) performativity
- (B) economy
- (C) efficiency
- (D) effectiveness

89. Gas turbine uses which of the following types of air compressor?

- (A) Centrifugal type
- (B) Axial flow type
- (C) Reciprocating type
- (D) Rotary type

90. What is the least count of micrometer?

- (A) 0.1 mm
- (B) 0.02 mm
- (C) 0.01 mm
- (D) 0.2 mm

91. The degree of closeness of the measured value of certain quantity with its true value is known as

- (A) accuracy
- (B) precision
- (C) standard
- (D) sensitivity

92. In the annuity method of depreciation, interest is charged on

- (A) depreciation annuity
- (B) book value of the asset
- (C) salvage value of the asset
- (D) sum of depreciation annuity and book value of the asset

93. 'Go' and 'No Go' gauge are types of
- (A) plug gauge
  - (B) step gauge
  - (C) ring gauge
  - (D) limit gauge
94. Expressing a dimension as  $25^{+0.05}$  mm is done in the case of
- (A) unilateral dimension
  - (B) bilateral dimension
  - (C) limiting dimension
  - (D) All of the above
95. CAD/CAM is the relationship between
- (A) design and manufacturing
  - (B) science and engineering
  - (C) manufacturing and marketing
  - (D) design and marketing
96. The common electrolyte in electro-chemical machining process is
- (A) water
  - (B) transformer oil
  - (C) kerosene
  - (D) brine solution
97. Which of the following methods uses the combination of electrical and chemical energy for machining?
- (A) Ultrasonic machining
  - (B) Abrasive Jet machining
  - (C) Electro-chemical machining
  - (D) Electron beam machining
98. Which of the following processes can be used to produce very small diameter holes?
- (A) Electric discharge machining
  - (B) Electro-chemical machining
  - (C) Water jet machining
  - (D) Electron beam machining
99. In a petrol engine, the tendency of detonation increases with
- (A) supercharging
  - (B) retarded spark timing
  - (C) running the engine at high speed
  - (D) increasing the cooling rate
100. Aircraft body has
- (A) precast structure
  - (B) welded structure
  - (C) riveted structure
  - (D) bolted structure



**SPACE FOR ROUGH WORK**

**SPACE FOR ROUGH WORK**

**SEAL**

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**VI/TRNS/MEE/II/24/4-A**

**16**

**T25—475×4**