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

Test Booklet No. : 00361

Series A

TEST BOOKLET
Paper—II
(AUTOMOBILE 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.

SEAL

[No. of Questions : 100]

1. Which of the following types of OS reads and reacts in terms of actual time?

   (A) Quick-sharing OS

   (B) Time-sharing OS

   (C) Real-time OS

   (D) Batch OS

2. Which of the following is ***not*** a keyword in C?

   (A) Else

   (B) Switch

   (C) Include

   (D) Continue

3. Microsoft Windows is

   (A) an word processing program

   (B) a database program

   (C) an operating system

   (D) a graphics program

4. The correct representation of a binary number is

   (A) $(124)_2$

   (B) 1110

   (C) $(110)^2$

   (D) $(000)_2$

5. In break-even analysis, total cost consists of

   (A) fixed cost + sales revenue

   (B) variable cost + sales revenue

   (C) fixed cost + variable cost

   (D) fixed cost + variable cost + profit

6. Production is the creation of

   (A) utility

   (B) wealth

   (C) goods and services

   (D) value

7. The basic rule of book-keeping, debit the receiver and credit the giver, is applicable to

   (A) nominal account

   (B) real account

   (C) personal account

   (D) drawing account

8. Cash discount is recorded in

   (A) sales book

   (B) purchase book

   (C) cashbook

   (D) Both (A) and (B)

9. A current is said to be alternating when it changes in

(A) magnitude only

(B) direction only

(C) both magnitude and direction

(D) None of the above

10. According to 'Fleming right-hand rule' for finding the direction of induced e.m.f., when middle finger points in the direction of induced e.m.f., forefinger will point in the direction of

(A) motion of conductor

(B) lines of force

(C) Both (A) and (B)

(D) None of the above

11. The ratio of real power to apparent power in an AC circuit is called

(A) peak factor

(B) form factor

(C) power factor

(D) crest factor

12. A fuse is provided in an electric circuit for

(A) safeguarding the installation against heavy current

(B) reducing the current flow in the circuit

(C) reducing the power consumption

(D) All of the above

13. EIA is

(A) Environmental Internal Assessment

(B) Environmental Impact Assessment

(C) Environmental Interaction Assessment

(D) Environmental Impact Analysis

14. Ecology deals with the study of

(A) living beings

(B) living and non-living beings

(C) reciprocal relationship between living and non-living components

(D) None of the above

15. The ratio of inertia force to surface tension is known as

(A) Mach number

(B) Froude number

(C) Reynolds' number

(D) Weber number

16. A foot valve is provided on

(A) centrifugal pumps

(B) Kaplan turbines

(C) Pelton wheels

(D) reciprocating pumps

17. Water hammer in pipes takes place when

(A) fluid is flowing with high velocity

(B) fluid is flowing with high pressure

(C) flowing fluid is gradually brought to rest

(D) flowing fluid is suddenly brought to rest by closing the valve

18. In metal machining, the zone where the maximum heat is generated is

(A) shear zone

(B) chip-tool interface zone

(C) tool-work interface zone

(D) None of the above

19. Drilling operation is an example of

(A) oblique cutting

(B) orthogonal cutting

(C) simple cutting

(D) uniform cutting

20. Projection welding is

(A) a multispot welding process

(B) a continuous spot welding process

(C) an arc welding process

(D) None of the above

21. The camshaft of a four-stroke IC engine running at 1500 r.p.m. will run at

(A) 1500 r.p.m.

(B) 750 r.p.m.

(C) 3000 r.p.m.

(D) any value independent of engine speed

22. The ratio of primary to secondary winding ignition coil turns is, approximately

(A) 1 : 10

(B) 1 : 50

(C) 1 : 100

(D) 1 : 200

23. The slip joint of propeller shaft permits a change in the

(A) angle of drive

(B) rotation of the shaft

(C) speed of the shaft

(D) length of the shaft

24. The knock in diesel engine occurs due to

(A) instantaneous and rapid burning of the first part of charge

(B) instantaneous auto-ignition of the last part of charge

(C) delayed burning of the first part of charge

(D) reduction of delay period

25. Ignition timing of a multicylinder petrol engine can be adjusted by

(A) rotating the crank

(B) adjusting the spark plug gap

(C) adjusting ignition coil position

(D) rotating the distribution

26. Which of the following antifreeze solutions is commonly used in automobile?

(A) Alcohol

(B) Carbon disulphide

(C) Brine

(D) Ammonium chloride

27. The gas constant R is equal to the

(A) sum of two specific heats

(B) difference of two specific heats

(C) product of two specific heats

(D) ratio of two specific heats

28. The basis for the measurement of temperature is given by the

(A) first law of thermodynamics

(B) zeroth law of thermodynamics

(C) second law of thermodynamics

(D) third law of thermodynamics

29. The heat absorbed by water at its saturation temperature to get converted into dry steam at the same temperature is called

(A) sensible heat

(B) specific heat

(C) latent heat

(D) total heat

30. In which operation on a workpiece on lathe, the spindle speed will be least?

(A) Taper turning

(B) Thread cutting

(C) Plain turning

(D) Finishing

31. In a drilling operation

(A) torque is equal to the axial force

(B) torque is more than the axial force

(C) torque is less than the axial force

(D) torque is half the axial force

32. In case of a shaper equipped with 'Whitworth mechanism'

(A) the cutting stroke is faster than the return stroke

(B) the return stroke is faster than the cutting stroke

(C) both the cutting and return strokes take the same time

(D) the return stroke is slower than the cutting stroke

33. Feed rate in milling machine is equal to

(A) RPM

(B) RPM × No. of teeth

(C) RPM × Feed per tooth × No. of teeth

(D) $\frac{\text{RPM} \times \text{Feed per tooth} \times \text{No. of teeth}}{2}$

34. In EDM, the rate of metal removal M varies with discharge voltage V as

(A) $M \propto \frac{1}{V}$

(B) $M \propto V$

(C) $M \propto V^2$

(D) $M \propto V^3$

35. Point angle of 118° on drills is used for

(A) all general applications on mild steel

(B) bakelite, hard rubber and fibrous plastics

(C) hard steel and nickel alloys

(D) thin sheet metal

36. Identify the incorrect combination.

(A) Ball bearing and roller bearing : Rolling pair

(B) Crosshead and guides : Sliding pair

(C) A bolt and nut : Turning pair

(D) A ball and socket joint : Spherical pair

37. In a flat belt drive, the belt can be subjected to maximum tension T and centrifugal tension T_c. For maximum power transmission

(A) $T = T_c$

(B) $T = \sqrt{3T_c}$

(C) $T = 2T_c$

(D) $T = 3T_c$

38. Leaf springs are subjected to, and absorbs shocks by

(A) shear stress

(B) direct stress

(C) bending stress

(D) None of the above

39. The ball masses of a governor have the same equilibrium speed for all radius of rotation of the balls within the working range. This characteristic of the governor is referred to as

(A) stability

(B) hunting

(C) sensitivity

(D) isochronism

40. The pitch point of a cam-follower mechanism is

(A) any point on the pitch circle

(B) any point on the pitch curve

(C) a point on the cam pitch curve having the maximum pressure angle

(D) a reference point on the follower for the purpose of tracing the cam profile

41. When a shaft is subjected to a twisting moment, every cross-section of the shaft will be in

(A) tensile stress

(B) compressive stress

(C) shear stress

(D) bending stress

42. The bending moment at the free end of a cantilever beam is

(A) minimum

(B) maximum

(C) zero

(D) None of the above

43. The ability of a body to absorb energy and to deform plastically without fracturing is known as

(A) creep

(B) elasticity

(C) plasticity

(D) toughness

44. The distance between the centre of a rivet hole to the nearest edge of plate is called

(A) pitch

(B) back pitch

(C) margin

(D) diagonal pitch

45. The advantage of a tandem master cylinder is that it

(A) enhances safety by serving two independent lines in a divided-line brake circuit

(B) enhances safety by activating the brakes using vacuum pressure in the event of brake fluid loss

(C) supplies equal fluid pressure to each line of a divided-line brake circuit, thereby preventing the brakes from dragging on one side

(D) increases the brake fluid pressure to reduce the force required to depress the brake pedal

46. The process of removing all of the old brake fluid from the hydraulic system is called

(A) bleeding

(B) cleaning

(C) changing

(D) flushing

47. A front stabilizer bar is used to

(A) increase vehicle load-carrying capacity

(B) provide a softer ride

(C) control suspension movement and body roll

(D) All of the above

48. In which type of gearbox, sliding dog clutch is present?

(A) Sliding mesh

(B) Synchromesh

(C) Constant mesh

(D) None of the above

49. The combination wrench

(A) has boxes at both ends

(B) has box at one end and is open at one end

(C) is open at both ends

(D) has replaceable socket

50. ARAI stands for

(A) Automobile Research Association of India

(B) Automobile Research Associate of India

(C) Automotive Research Association of India

(D) Automotive Research Associate of India

51. For speeding up the tightening work, we have to use wrench with

(A) long handle

(B) ratchet handle

(C) braced handle

(D) extension bar

52. Which type of jack is a standard accessory with cars?

(A) Trolley type

(B) Scissor type

(C) Screw type

(D) None of the above

53. Which of the following is a boiler accessory?

(A) Fusible plug

(B) Water level indicator

(C) Economiser

(D) Stop valve

54. Bleeding in turbine means

(A) extracts steam for pre-heating feedwater

(B) removal of condensed steam

(C) exhausted steam in condenser

(D) leakage of steam

55. The effect of friction when steam flows across the blade passages is expressed by the ratio of relative velocities at outlet and inlet $\left(K = \frac{C_{r2}}{C_{r1}}\right)$. The factor is called

(A) friction factor

(B) blade velocity coefficient

(C) utilization factor

(D) blade speed ratio

56. The length of tail pipe filled to the barometric or high-level jet condenser is about

(A) 6·2 metres

(B) 7·6 metres

(C) 8·5 metres

(D) 10·4 metres

57. A composite slab has two layers of different materials having thermal conductivities k_1 and k_2. If each layer has same thickness, the equivalent thermal conductivity of the slab would be

(A) $\frac{k_1 k_2}{k_1 + k_2}$

(B) $\frac{k_1 k_2}{2(k_1 + k_2)}$

(C) $\frac{2k_1}{k_1 + k_2}$

(D) $\frac{2k_1 k_2}{k_1 + k_2}$

58. Moderator in a nuclear powerplant is used to

(A) protect against neutron and gamma rays

(B) absorb excess neutrons

(C) slow down the speed of fast-moving neutrons

(D) return the neutrons back into the core of reactor

59. In industrial engineering, the term 'quality control' means

(A) maintaining product standards and consistency

(B) financial risk analysis

(C) ensuring employee and consumer satisfaction

(D) maintaining production cost as per management's guideline

60. The type of organization preferred for an automobile industry is

(A) line organization

(B) functional organization

(C) line and staff organization

(D) line, staff and functional organization

61. Gantt chart provides information about

(A) breakeven point analysis

(B) production schedule

(C) material handling layout

(D) determining selling price

62. Method study needs to be taken up when there is

(A) fatigue working and wastage of material

(B) faulty production planning and control

(C) inadequate process capacity

(D) dissatisfaction among worker

63. Bin cards are used in

(A) machine loading

(B) fixing target

(C) quality control

(D) stores

64. In the Halsey system of wage incentive plan, a worker is

(A) paid as per efficiency

(B) ensured of minimum wages

(C) not paid any bonus till his efficiency reaches $66\frac{2}{3}\%$

(D) never a loser

65. Condensing temperature in a refrigerator is the temperature

(A) of cooling medium

(B) of freezing zone

(C) of evaporator

(D) at which the refrigerator gas becomes liquid

66. In psychrometric chart, the vertical lines parallel to the ordinates indicate

(A) dry-bulb temperature

(B) wet-bulb temperature

(C) specific humidity

(D) enthalpy of saturation

67. Which of the following is ***not*** a desirable property of a good refrigerant?

(A) Low specific heat

(B) High specific volume of vapour

(C) Low boiling point

(D) High critical temperature

68. Which of the following power plants has the highest share of installed capacity?

(A) Hydro

(B) Coal

(C) Nuclear

(D) Gas

69. The output voltage of a solar cell is, approximately

(A) 0·6 V

(B) 1·5 V

(C) 2·1 V

(D) 3 V

70. The working fluid in closed cycle OTEC plant is

(A) water

(B) seawater

(C) ammonia

(D) chlorofluorocarbon

71. The term 'entrepreneur' is derived from the term 'entreprendre' which means

(A) to give

(B) to undertake

(C) to choose

(D) to decide

72. The first management principle was developed by

(A) Frederick Taylor

(B) Charles Handy

(C) Henri Fayol

(D) William Petty

73. Human resource management is the amalgamation of

(A) job analysis, recruitment and selection

(B) social behaviour and business ethics

(C) organizational behaviour, personal management and industrial relation

(D) employer and employees

74. If one cylinder of diesel engine receives more fuel than the others, then for that cylinder, the

(A) exhaust will be smoky

(B) scavenging occurs

(C) piston rings would stick into piston grooves

(D) engine starts overheating

75. The basic requirement of a good combustion chamber is

(A) high compression ratio

(B) low volumetric efficiency

(C) minimum turbulence

(D) high power output and high thermal efficiency

76. In a typical medium speed 4-stroke cycle diesel engine

(A) exhaust valve opens at 35° before bottom dead centre and closes at 20° after top dead centre

(B) exhaust valve opens at bottom dead centre and closes at top dead centre

(C) exhaust valve opens just after bottom dead centre and closes just before top dead centre

(D) may open and close anywhere

77. Which type of gears are preferred for low noise application?

(A) Spur gears with cycloidal profile

(B) Spur gears with involute profile

(C) Bevel gears

(D) Helical gears

78. Taper roller bearings are used in automobile for

(A) wheels

(B) gearbox

(C) differential

(D) engine crank shaft

79. Piston rings are usually made of

(A) cast iron

(B) stainless steel

(C) high carbon steel

(D) aluminium

80. The capacity of a battery is determined by the number of plates per cell and

(A) the number of cells

(B) the size of plates

(C) the shape of plates

(D) the number of separators

81. In an AC generator, magnetic field is produced in the

(A) armature

(B) regulator

(C) stator

(D) rotor

82. The number of diodes used in an alternator is

(A) 1

(B) 2

(C) 4

(D) 6

83. The major purpose of an electronically controlled automatic transmission is that this type of transmission

(A) eliminates gear clutches

(B) eliminates the gear shift lever

(C) reduces the number of automatic transmission components

(D) reduces shift shock and achieves more efficient transmission of engine torque

84. Three components of primary ignition circuit are

(A) the contact breaker, condenser and distributor cap

(B) the contact breaker, ignition coil and spark plug

(C) the contact breaker, ignition switch and condenser

(D) the contact breaker, ignition switch and spark plug

85. The type of battery used in electric vehicle is

(A) nickel-cadmium battery

(B) lithium-ion battery

(C) nickel-metal hydride battery

(D) zinc air battery

86. Direct cost of a product, manufactured in a factory, is determined by the sum of

(A) direct material, direct expenses and indirect labour

(B) direct material, direct expenses and direct labour

(C) direct material, indirect expenses and indirect labour

(D) indirect material, direct expenses and direct labour

87. The basic purpose of providing caster angle on wheels is to

(A) prevent uneven tyre wear

(B) maintain directional control and stability

(C) bring the road contact of the tyre under the point of load

(D) compensate for wear in the steering linkage

88. If a square bar is of 4 cm side and 30 cm length, what is the volume?

(A) 450 m^3

(B) 480 cm^3

(C) 480 mm^3

(D) 480 m^3

89. The operation to be performed with hammer in sheet metal shop is

(A) riveting work

(B) bending of sheets

(C) smoothening of sheets

(D) All of the above

90. 'Go' and 'No Go' gauges are types of

(A) limit gauge

(B) ring gauge

(C) slip gauge

(D) plug gauge

91. The term 'allowance' in limit and fits is usually referred to

(A) minimum clearance between shaft and hole

(B) maximum clearance between shaft and hole

(C) a difference of tolerance of hole and shaft

(D) difference between maximum size and minimum size of the hole

92. A plug gauge is used for measuring

(A) cylinders

(B) cylinder bore

(C) spherical hole

(D) screw threads

93. The measuring tip of a comparator, for general use should be

(A) grooved

(B) conical

(C) spherical

(D) flat

94. Which one of the following is ***not*** a type of accumulator?

(A) Gravity type

(B) Spring-loaded type

(C) Gas-loaded type

(D) Differential temperature type

95. Most suitable roller effective in compacting cohesive soils is

(A) sheep foot roller

(B) smooth wheel roller

(C) pneumatic tire roller

(D) vibratory roller

96. In case of a crane, what type of part is attached to the fixed cylindrical chamber which moves in the upward or downward direction?

(A) Jigger

(B) Sliding ram

(C) Crown

(D) Pulley

97. An equipment which is very useful and which can be used for construction work, like to clear the site of work, to make the land level etc. is

(A) scraper

(B) grader

(C) excavator

(D) bulldozer

98. Which type of equipment is used to level the ground and spreads the loose material?

(A) Excavator

(B) Scraper

(C) Grader

(D) Tractor

99. The heat transfer from coolant to air in the radiator of an automobile engine takes place by

(A) radiation only

(B) convection only

(C) convection and radiation

(D) conduction, convection and radiation

100. Thermal efficiencies of petrol and diesel engine are

(A) 30% and 70%

(B) 15% and 50%

(C) 50% and 70%

(D) 15% and 70%

SPACE FOR ROUGH WORK

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