

Question Booklet No.

Question Booklet Series :

A

AUAT — 2024
2-Year M. Tech. in Mechanical Engineering (P22)
(TEST BASED ON MCQ)

Full Marks : 100

Duration : 2 Hours

Roll No. of the Candidate : _____

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IMPORTANT INSTRUCTIONS

Candidates should read the below instructions carefully and follow them accordingly.

1. The Question Booklet has paper seal pasted on it. Please do **NOT** open the Question Booklet until you are asked to do so by the Invigilator.
2. The candidates must check immediately after breaking the seal that the Question Booklet contains **100 Multiple Choice Questions** in two parts (Part—I and Part—II).
3. Answer of questions of Part—I and Part—II both will have to be given on the **OMR Answer Sheet** provided for this purpose. Fill up the necessary fields that are intended for you by writing and/or shading appropriately. Otherwise the **OMR Answer Sheet cannot** be evaluated and will liable to be rejected. Question numbers progress from **1** to **100** continuously with alternative answers being shown as [A], [B], [C] and [D] for each question. Record your response by completely darkening the corresponding bubble. While responding, you should consider the best alternative answer and shade only one bubble with **black/blue ball point pen** only. For each correct response you will be awarded **1** mark. There will be negative marking for wrong responses. For each wrong response, **-0.25** mark will be awarded. Multiple responses against one **MCQ** will be treated as a wrong response.
4. On leaving the examination hall, candidates must submit the **OMR Answer Sheet**. They are allowed to keep the Question Booklet with them.
5. **OMR Answer Sheet** will be processed by electronic means. Any untoward/irrelevant remarks, folding or putting stray notes on the answer sheet, any damage to the answer sheet will lead to the rejection of the same and the sole liability shall remain with the candidate.
6. Rough Work may be done at the end of the Question Booklet.
7. No candidate will be allowed to leave the examination hall before completion of the examination.
8. Use of any Electronic device like Mobile, Programmable Calculator etc. is strictly prohibited.

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PART—I
(Core Subject)

1. Drilling is an example of
[A] orthogonal cutting
[B] oblique cutting
[C] simple cutting
[D] uniform cutting
2. Property of a fluid by which its own molecules are attracted is called
[A] adhesion
[B] cohesion
[C] viscosity
[D] surface tension
3. Kinematic viscosity is dependent upon
[A] pressure
[B] distance
[C] density
[D] flow
4. Surface tension has the units of
[A] Newtowns/m²
[B] Newtowns/m
[C] Newtowns
[D] Newtown-m
5. Rotameter is used to measure
[A] viscosity
[B] flow
[C] pressure
[D] velocity
6. Continuity equation relates
[A] conservation of mass and momentum
[B] energy and work
[C] frictional losses
[D] mass rate of flow along a streamline
7. The factor considered for evaluation of machinability is
[A] cutting forces and power consumption
[B] tool life
[C] type of chips and shear angle
[D] All of the above
8. What does a positive displacement pump do?
[A] Increases fluid velocity
[B] Generates fluid pressure through centrifugal force
[C] Transfers a fixed volume of fluid per cycle
[D] Converts fluid kinetic energy into potential energy
9. Which type of turbine is typically used for low head and high flow rate applications?
[A] Pelton turbine
[B] Kaplan turbine
[C] Wind turbine
[D] Crossflow turbine
10. What is the purpose of a draft tube in a reaction turbine?
[A] To increase the rotational speed of the turbine
[B] To convert fluid kinetic energy into electrical energy
[C] To direct the flow of fluid away from the turbine
[D] To recover pressure energy from the fluid exiting the turbine

11. What is stand alone data acquisition system often called?
- [A] Data Blogger
 - [B] Data Logger
 - [C] Data Vlogger
 - [D] Digital Blogger
12. Which type of pump is commonly used for oil extraction in the petroleum industry?
- [A] Centrifugal pump
 - [B] Diaphragm pump
 - [C] Reciprocating pump
 - [D] Gear pump
13. Which equation is used to describe the relationship between pressure, velocity and elevation in fluid flow?
- [A] Bernoulli's equation
 - [B] Pascal's principle
 - [C] Archimedes' principle
 - [D] Boyle's law
14. Which type of flow is characterized by irregular fluctuations in velocity and pressure?
- [A] Laminar flow
 - [B] Transitional flow
 - [C] Turbulent flow
 - [D] Compressible flow
15. Which law states that the buoyant force on an object is equal to the weight of the fluid displaced by the object?
- [A] Bernoulli's principle
 - [B] Pascal's law
 - [C] Archimedes' principle
 - [D] Newton's law of viscosity

16. Which law of thermodynamics states that energy cannot be created or destroyed, only transformed from one form to another?
- [A] Zeroth law
 - [B] First law
 - [C] Second law
 - [D] Third law
17. Which property of a substance remains constant during an isentropic process?
- [A] Temperature
 - [B] Pressure
 - [C] Entropy
 - [D] Specific volume
18. Which process is characterized by constant pressure in a closed system?
- [A] Isochoric process
 - [B] Isobaric process
 - [C] Isothermal process
 - [D] Adiabatic process
19. Which cycle is used as an ideal standard for comparison with real heat engines?
- [A] Rankine cycle
 - [B] Otto cycle
 - [C] Brayton cycle
 - [D] Carnot cycle
20. What does the term 'adiabatic' mean in thermodynamics?
- [A] Constant temperature
 - [B] Constant pressure
 - [C] No heat transfer
 - [D] No work transfer

- 21.** Which mode of heat transfer **does not** require a medium for propagation?
- [A] Conduction
 - [B] Convection
 - [C] Radiation
 - [D] None of the above
- 22.** What is the primary mode of heat transfer in a vacuum?
- [A] Conduction
 - [B] Convection
 - [C] Radiation
 - [D] Advection
- 23.** What is the unit of thermal conductivity?
- [A] Watts per square meter (W/m^2)
 - [B] Watts per meter-Kelvin ($\text{W}/(\text{m.K})$)
 - [C] Joules per kilogram-Kelvin ($\text{J}/(\text{kg.K})$)
 - [D] Newtons per meter (N/m)
- 24.** Which principle states that the total heat gained by a system must equal the total heat lost by the surroundings?
- [A] Newton's law of cooling
 - [B] Fourier's law
 - [C] Kirchhoff's law
 - [D] First law of thermodynamics
- 25.** What type of surface is a good emitter of thermal radiation?
- [A] White, reflective surface
 - [B] Smooth, shiny surface
 - [C] Black, matte surface
 - [D] Transparent surface
- 26.** Which material property determines the ability of a material to store and release heat?
- [A] Thermal conductivity
 - [B] Density
 - [C] Specific heat capacity
 - [D] Thermal diffusivity
- 27.** Which fuel is commonly used in combined cycle power plants?
- [A] Coal
 - [B] Natural gas
 - [C] Uranium
 - [D] Wood
- 28.** Which component in a coal-fired power plant removes impurities and pollutants from the flue gas?
- [A] Boiler
 - [B] Turbine
 - [C] Electrostatic precipitator
 - [D] Condenser
- 29.** Which type of power plant uses heat from the Earth's interior to generate electricity?
- [A] Nuclear power plant
 - [B] Geothermal power plant
 - [C] Wind power plant
 - [D] Tidal power plant
- 30.** Which type of power plant operates based on the Rankine cycle?
- [A] Steam power plant
 - [B] Gas turbine power plant
 - [C] Diesel power plant
 - [D] Hydroelectric power plant.
- 31.** Which term describes the ability of a material to resist deformation under the elastic limit?
- [A] Strain
 - [B] Stress
 - [C] Stiffness
 - [D] Poisson's ratio

- 32.** Which is an example of zero Poisson's ratio material?
[A] Rubber
[B] Steel
[C] Acrylic
[D] Cork
- 33.** Which type of failure occurs in a material when it is subjected to repeated or fluctuating loads below its ultimate strength?
[A] Yield failure
[B] Creep failure
[C] Fatigue failure
[D] Brittle failure
- 34.** What does the term "modulus of resilience" represent in solid mechanics?
[A] The ability of a material to resist permanent deformation
[B] The ability of a material to absorb energy up to fracture
[C] The ability of a material to recover its original shape after deformation
[D] The maximum strain energy a material can absorb per unit volume without plastic deformation
- 35.** Which property of a material is determined by the area under the stress-strain curve?
[A] Ultimate tensile strength
[B] Modulus of elasticity
[C] Toughness
[D] Yield strength
- 36.** Which type of welding process uses a consumable electrode and a shielding gas to protect the weld pool?
[A] Gas metal arc welding (GMAW)
[B] Shielded metal arc welding (SMAW)
[C] Gas tungsten arc welding (GTAW)
[D] Flux-Corred (Plasma) arc welding (FCAW)

- 37.** Which type of gear is used to change the speed and direction of rotation in machinery?
[A] Spur gear
[B] Helical gear
[C] Bevel gear
[D] Worm gear
- 38.** What is the primary purpose of a riser in casting?
[A] To provide a pathway for molten metal to flow into the mold cavity
[B] To prevent shrinkage defects by supplying additional molten metal during solidification
[C] To remove impurities from the molten metal
[D] To control the cooling rate of the casting
- 39.** Which casting process involves injecting molten metal under high pressure into a mold cavity?
[A] Sand casting
[B] Investment casting
[C] Die casting
[D] Centrifugal casting
- 40.** What type of pattern is used in investment casting to create complex metal parts with fine details?
[A] Wooden pattern
[B] Plastic pattern
[C] Wax pattern
[D] Metal pattern
- 41.** Which defect in casting is caused by the improper alignment of mold sections?
[A] Shrinkage defect
[B] Blowhole
[C] Misrun
[D] Mismatch

- 42.** In sand casting, what is the purpose of a core?
- [A] To provide additional support to the mold cavity
 - [B] To reduce the weight of the casting
 - [C] To create hollow sections in the casting
 - [D] To improve the surface finish of the casting
- 43.** What is the term for the process of removing excess material from a casting to achieve the final shape and dimensions?
- [A] Fettling
 - [B] Drafting
 - [C] Pattern making
 - [D] Core making
- 44.** Which casting process utilizes a rotating mold to create cylindrical metal parts such as pipes or tubes?
- [A] Sand casting
 - [B] Investment casting
 - [C] Die casting
 - [D] Centrifugal casting
- 45.** Which defect in casting is caused by the incomplete filling of the mold cavity?
- [A] Shrinkage defect
 - [B] Blowhole
 - [C] Misrun
 - [D] Mismatch
- 46.** Which forming process involves stretching a sheet metal over a die cavity to form a desired shape?
- [A] Stamping
 - [B] Deep drawing
 - [C] Rolling
 - [D] Extrusion
- 47.** Which type of material undergoes significant plastic deformation during the forming process without fracture?
- [A] Brittle material
 - [B] Ductile material
 - [C] Composite material
 - [D] Ceramic material
- 48.** Which forming process is used to create cylindrical parts by forcing a billet through a die?
- [A] Stamping
 - [B] Extrusion
 - [C] Forging
 - [D] Swaging
- 49.** What is the purpose of a filler metal in welding?
- [A] To shield the weld pool
 - [B] To provide electrical conductivity
 - [C] To enhance the mechanical properties of the joint
 - [D] To fill the gap between the base metals
- 50.** Which type of bonding is predominant in ceramics?
- [A] Metallic bonding
 - [B] Covalent bonding
 - [C] Ionic bonding
 - [D] Van der Waals bonding
- 51.** What property of a material refers to its ability to absorb energy before fracture?
- [A] Resilience
 - [B] Toughness
 - [C] Hardness
 - [D] Elasticity
- 52.** External taper can be accurately measured with the help of
- [A] sine bar and slip gauges
 - [B] dividing head
 - [C] precision balls and height gauge
 - [D] clinometer

53. What type of crystal structure is typically exhibited by metals such as gold, aluminum and copper?

- [A] Face-centered cubic (fcc)
- [B] Body-centered cubic (bcc)
- [C] Hexagonal close packed (hcp)
- [D] Tetragonal

54. Which alloying element is commonly added to steel to improve its corrosion resistance?

- [A] Copper
- [B] Chromium
- [C] Aluminum
- [D] Zinc

55. Which material property describes the resistance of a material to indentation or scratching?

- [A] Ductility
- [B] Toughness
- [C] Hardness
- [D] Elasticity

56. What is the primary difference between amorphous and crystalline materials?

- [A] Amorphous materials have a regular atomic structure, while crystalline materials have a disordered atomic structure
- [B] Amorphous materials have a disordered atomic structure, while crystalline materials have a regular atomic structure
- [C] Amorphous materials are ductile, while crystalline materials are brittle
- [D] Amorphous materials exhibit metallic bonding, while crystalline materials exhibit covalent bonding

57. What is the primary function of a flywheel in a machine?

- [A] To store energy and smooth out fluctuations in speed
- [B] To transmit power between shafts
- [C] To provide linear motion
- [D] To increase the mechanical advantage of a system

58. What is the purpose of a governor in a machine system?

- [A] To provide rotary motion
- [B] To control the speed of an engine or machine
- [C] To transmit power between shafts
- [D] To amplify mechanical force

59. Which type of bearing is used to support radial and axial loads simultaneously?

- [A] Thrust bearing
- [B] Journal bearing
- [C] Tapered roller bearing
- [D] Spherical roller bearing

60. What is the primary advantage of using robotics in manufacturing processes?

- [A] Lower initial investment cost
- [B] Reduced flexibility in production
- [C] Improved accuracy and repeatability
- [D] Decreased complexity in operations

61. Which machining operation is used to produce internal threads in a workpiece?

- [A] Tapping
- [B] Facing
- [C] Turning
- [D] Boring

- 62.** Which of the following layouts is suited to job production?
- [A] Process layout
 - [B] Product layout
 - [C] Plant layout
 - [D] Functional layout
- 63.** Which technique is used to determine the optimal sequence of tasks in a project to minimize project duration?
- [A] PERT (Program Evaluation and Review Technique)
 - [B] CPM (Critical Path Method)
 - [C] Queuing theory
 - [D] Transportation problem
- 64.** Which of the following thermocouple generates highest e.m.f. for a given temperature?
- [A] Copper-constantan
 - [B] Iron-constantan
 - [C] Chromel-alumel
 - [D] Silver-palladium.
- 65.** What does CNC machine use to control motion and speed?
- [A] Numerical
 - [B] Programs, as well as computer keyboard, graphical user interface
 - [C] Feedback system
 - [D] GUI
- 66.** The main function of actuator is
- [A] to produce motion
 - [B] detect input
 - [C] detect output
 - [D] detect the state of the system

- 67.** What converts physical input into output, among the basic parts of a measuring system?
- [A] Transducer or sensor
 - [B] Signal conditioning
 - [C] Intelligence
 - [D] Display
- 68.** What are transducers?
- [A] They convert power from one form to another
 - [B] They convert work from one form to another
 - [C] They convert work to power
 - [D] They convert energy from one form to another
- 69.** Which type of system uses 'oil under pressure' means for power transmission?
- [A] Fluid power system
 - [B] Hydraulic system
 - [C] Pneumatic system
 - [D] Stepper motors
- 70.** Which kind of sensor in mechatronics can detect the presence or absence of items or targets within its sensing range without requiring physical contact?
- [A] Displacement sensor
 - [B] Proximity sensor
 - [C] Position sensor
 - [D] Velocity sensor

PART—II

(Islamic History and Culture, General English & General Knowledge)

71. As-salamu alaykum means

আস-সালামু আলাইকুম-এর অর্থ

[A] How are you?

[B] Peace be upon you

[C] Wish you good luck

[D] Glory be to Allah

72. Which of the following is/are **true**?

নিম্নের কোনটি/কোনগুলি সঠিক?

[A] Muhammad (PBUH) is the last Prophet of Islam

[B] Islam existed since the beginning

[C] All Prophets practiced and propagated Islam

[D] All of the above

73. The *Holy Qur'an* can be read by

‘পবিত্র কুরআন’ পড়তে পারেন

[A] only scholars

[B] only rich people

[C] only men

[D] everybody

74. The prayer at the evening is called

সন্ধ্যাবেলার নামাযকে বলা হয়

[A] Asr

[B] Maghrib

[C] Tahajjud

[D] None of the above

75. The number of most notable companions of Prophet Muhammad (PBUH) is

নবী মুহাম্মদ (সা.)-এর বিশেষভাবে উল্লেখযোগ্য সাহাবীর সংখ্যা হল

[A] 1

[B] 4

[C] 40

[D] 313

76. One who receives revelation in the form of message but not book is called a

বার্তা আকারে যিনি ঐশী প্রত্যাদেশ পান, অথচ গ্রন্থাকারে নয়, তিনি হলেন একজন

[A] Prophet but not messenger

[B] messenger but not Prophet

[C] Prophet as well as messenger

[D] neither Prophet nor messenger

77. The name of the second last Prophet is

দ্বিতীয় শেষ নবীর নাম হল

[A] David

[B] Moses

[C] Jesus

[D] Ahmad

78. Who is called the ‘Father of Kitten’?

‘ছোট বিড়ালের পিতা’ কাকে বলা হয়?

[A] Abu Hurairah

[B] Abu Ubaida

[C] Talha

[D] Zubair

79. The first martyr in Islam is

ইসলামের প্রথম শহীদ হলেন

[A] Hasan

[B] Husain

[C] Sumayya

[D] Yasir

80. The meal taken for breaking the fast is called

রোযা সমাপ্ত করতে যে খাবার খাওয়া হয় তাকে বলা হয়

[A] Shari

[B] Iftar

[C] Lunch

[D] Dinner

81. A Prophet is called _____ in Arabic.

একজন নবীকে আরবীতে _____ বলা হয়।

- [A] Nabi
- [B] Rasul
- [C] Wahi
- [D] None of the above

82. Which gates are opened during the month of Ramadan?

রমজান মাসে কোন্ দরজাগুলো খোলা হয়?

- [A] Gates of Hell
- [B] Gates of Heaven
- [C] Gates of Light
- [D] Gates of Mosque

83. What Muslims must perform before offering salah (prayers)?

সালাত (নামায) পড়ার আগে মুসলমানদের কি করতে হয়?

- [A] Wearing of skull-cap
- [B] Wearing of perfume
- [C] Wudu (ablution)
- [D] Clipping of nails

84. Allah (s.w.t.) has _____.

আল্লাহ (সুবহানাঙ্ ওয়া তায়ালা)-এর _____ আছে।

- [A] a son
- [B] a partner
- [C] no partner
- [D] a daughter

85. What did the Prophet Muhammad (SAW) mention about the status of a Mother?

নবী মুহাম্মদ (সা.) মায়েদের মর্যাদা সম্পর্কে কী উল্লেখ করেছেন?

- [A] Mothers are not important at all
- [B] Paradise is beneath the feet of a mother
- [C] Mothers are bad women
- [D] None of the above

86. The Islamic Calendar is based on the _____.

ইসলামিক ক্যালেন্ডার _____-এর উপর ভিত্তি করে।

- [A] planets
- [B] solar
- [C] moon
- [D] sun

87. When will the Day of Judgement occur?

বিচার দিবস কখন ঘটবে?

- [A] Year 7000
- [B] Year 2050
- [C] Year 2060
- [D] Only Allah knows

88. What is dry ablution called?

শুকনো ওয়ুকে কি বলে?

- [A] Wudhu
- [B] Tayammum
- [C] Ghusl
- [D] None of the above

89. What is one unit of prayer called?

নামাযের একককে কী বলা হয়?

- [A] Fard
- [B] Rakah
- [C] Juz'
- [D] Sunnah

90. What is the name of the cloth worn by men for Hajj and Umrah?

হজ ও ওমরার জন্য পুরুষদের পরিধান করা কাপড়ের নাম কী?

- [A] Haram
- [B] Ihram
- [C] Qamis
- [D] Izaar

91. Choose the correct alternative :

- [A] Oats is a healthier alternative
- [B] Oats is a healthier alternatives
- [C] Oats is healthier alternatives
- [D] Oats are healthier alternatives

92. Fill in the blank with the **correct** alternative.

The ____ young neighbour greeted my parents.

- [A] amicable
- [B] amiable
- [C] inimical
- [D] enviable

93. Identify the antonym of the word 'GARRULOUS'.

- [A] Innocuous
- [B] Loquacious
- [C] Jabbering
- [D] Reticent

94. Choose the noun form of the word 'GLORIOUS'.

- [A] Glory
- [B] Glorify
- [C] Glorified
- [D] Glorifying

95. Fill in the blank with the **correct** alternative.

The boys failed to achieve a ____ victory in the match.

- [A] decided
- [B] decisive
- [C] deceived
- [D] divisive

96. Which State is called the 'Rice Bowl of India'?

কোন রাজ্যকে 'ভারতের চালের বাটি' বলা হয়?

- [A] Kerala
- [B] Karnataka
- [C] Andhra Pradesh
- [D] Tamil Nadu

97. When was the Battle of Haldighati fought?

হলদিঘাটের যুদ্ধ কবে হয়েছিল?

- [A] 1550
- [B] 1576
- [C] 1650
- [D] 1701

98. Which among the following is the first national park in India?

নিচের কোনটি ভারতের প্রথম জাতীয় উদ্যান?

- [A] Dachigam National Park
- [B] Rohila National Park
- [C] Pench National Park
- [D] Jim Corbett National Park

99. Which of the following is the highest award for literature in West Bengal?

নিচের কোনটি পশ্চিমবঙ্গের সাহিত্যের সর্বোচ্চ পুরস্কার?

- [A] Rabindra Puraskar
- [B] Nazrul Puraskar
- [C] Bankim Puraskar
- [D] Ananda Puraskar

100. Who was the first Chief Justice of the Calcutta High Court?

কলকাতা হাইকোর্টের প্রথম প্রধান বিচারপতি কে ছিলেন?

- [A] Phani Bhushan Chakravartti
- [B] William Hunter
- [C] Barnes Peacock
- [D] Romesh Chandra Mitra

SPACE FOR ROUGH WORK