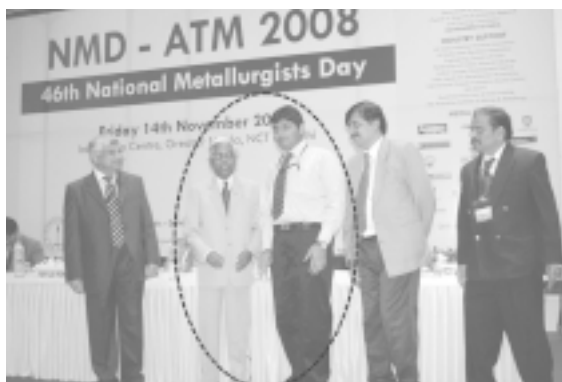


TMAQ

MODEL QUESTIONS



The Indian Institute of Metals

Tiruchirappalli Chapter



SCOPE OF THE QUIZ

History and evolution of materials: Origin of names of minerals and metals, use of metals in the early ages, metal extraction, ores, extraction processes, location of industries and availability of metals in India; Applications of common alloys; Iron and steel making, types of steels and cast irons and their applications.

Atomic structure & periodic table: Bonding; Crystalline materials: Metals, semiconductors, crystal defects, physical properties: Electronic, optical, thermal and magnetic properties; characterisation of materials: X - ray, electron microscopy etc.

Mechanical properties: Elasticity, plasticity and fracture: Tensile, creep, impact and hardness, Processing of metals: Cold and hot working, casting, powder metallurgy, metal joining.

Corrosion: Electro deposition, oxidation of metals, corrosion protection methods.

Non - destructive testing: Radiography, ultrasonic, electrical and magnetic methods, laser methods.

Advanced materials: Amorphous materials, ceramics, polymers, composites, biomaterials, materials in energy production and transport, nuclear materials, electronic materials.

MODEL QUESTIONS

A set of 100 model questions is enclosed. The Questions 1 to 75 are Oral Questions, indicating the model of questions, which a student can expect in the semi final / final rounds. The last 25 questions are objective type questions, which a student can expect in the written round of preliminary quiz. This may be used as guidance in preparing for the quiz.

The students are advised to read books on metals, materials and metallurgy. There are also plenty of websites, which could give a world of information on materials. The students are encouraged to go through them in their preparation process. Knowledge of materials is an asset in life. The Organisers of **TMAQ** wish the students a great learning experience, together with attractive fame and dime.

1. A variety of HAEMATITE (Fe_2O_3), occurs as rhombohedra crystals. It is black in colour and has attractive metallic lustre. What is its common name? **SPECULAR IRON**
2. Indian weaponry was famous in history. What was the alloy used for this called? **WOOTZ STEEL**
3. Name the element that is named after the Greek Goddess of moon & is today very essential to the process of reprography **SELENIUM**
4. Name the metal produced at the Zawar Mines in Rajasthan? **ZINC**
5. On December 2nd of this year Enrico Fermi accomplished the historic first nuclear chain reaction? **1942**
6. Which ionic compound is known as "Lunar caustic"? AgNO_3 , **SILVER NITRATE**
7. What is the name given to the alloy of elements Gold, Silver, Copper, Tin and Zinc that was use in the making of idols for temples. **PANCHALOKA**
8. What is the name given to describe the phenomenon in which there are dimensional changes associated with the magnetisation of a material such as Fe, Ni, Cu, etc. **MAGNETOSTRICTION**
9. All effect whereby a conductor carrying an electric current perpendicular to an applied magnetic field develops a voltage gradient transverse to both current and magnetic field is called as **HALL EFFECT**
10. What is the name given to the phenomenon when the material exhibits spontaneous electric polarisation that changes with heating **PYROELECTRICITY**
11. When a ferromagnetic material such as Fe is magnetised, while the magnetisation current is increased continuously, the magnetisation does not increase continuously, but as a series of small jumps. What is the name of this phenomenon? **BARKHAUSEN EFFECT**
12. The expulsion of magnetic flux by a super conducting material is referred to as **MEISSNER EFFECT**
13. In certain crystals such as calcite, the light travels at different speeds in different directions. What is this phenomenon called? **BI - REFRACTANCE**

14. A type of deformation behaviour, which although results in a complete recovery after the removal of stress, where a part of the deformation is viscous is called as **VISCO - ELASTICITY**
15. A tree like pattern that is usually formed by the solidification of a metal is called by a specific name. What is it?
DENDRITE
16. "Nataraja" idols were made by some casting route, which is used today to make turbine blades for jet engines. Name this casting route. **INVESTMENT CASTING (Also called as FULL MOULD CASTING)**
17. What is the name given to the process in which a block of metal is reduced in cross section by forcing it to flow through a die orifice under high pressure? **EXTRUSION**
18. What is the name given to the process that involves heating the sample in carbonaceous atmosphere to harden steel components? **CARBURISING**
19. What is the name given to the process in which a continuous sheet of the thermoplastic material is fabricated by squeezing the softened material between two horizontal rollers? **CALENDERING**
20. What is the name given to the process of heating natural rubber with sulphur, which results in the increase in cross linking of the polymer and an increase in strength? **VULCANISATION**
21. What is the name given to the process of coating zinc on steel? **GALVANISATION**
22. What is the common name for the mineral HgS? **CINNABAR**
23. A silicate of beryllium and aluminium, $3\text{BeO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2$ crystallizes in hexagonal form. The gem varieties are lustrous and transparent have emerald or aquamarine colour. What are these called? **BERYL**
24. A sulphide of Zn that crystallizes in cubic form. How is it referred to in mineralogy? **BLACK JACK**
25. Fool's Gold is of course not gold. What is it? **CHALCOPYRITE**
26. What is the common name for the mineral TiO_2 ? **RUTILE**
27. What is the popular name of cubic zirconia? **AMERICAN DIAMONDS**
28. What is the common name for the mineral potassium aluminium silicate (KAlSi_3O_8)? **FELDSPAR**
29. What is the trade name of the ceramic Silicon Carbide (SiC)? **CARBORUNDUM**
30. You may be aware that ceramics are increasingly being used as bio-compatible materials. Which is the ceramic material used as prosthesis for hip joints? **ALUMINA (Al_2O_3)**
31. What is the technical term that characterizes the high melting point ceramics? **REFRACTORY**
32. What is the important property of ceramics like BaTiO_3 that is used in the fabrication of ceramic disk capacitors?
HIGH DIELECTRIC CONSTANT
33. A ceramic, $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ is used as a refractory material for furnace linings. What is its common name? **MULLITE**
34. A naturally occurring oxide of aluminium that forms rhombohedral crystal and nearly as hard as diamond is called as
CORUNDUM
35. A class of materials closely related to magnetic, having superior magnetic properties in view of their lower conductivity are called as **FERRITES**
36. Natural rubber is polymer. Can you tell the name of the monomer out of which this polymer is made? **ISOPRENE**
37. We all know that cotton is one the natural fibres that is derived from Plants. Can you name another? **JUTE or HEMP**
38. What is the common name for the polymeric material Phenol Formaldehyde? **BAKELITE**
39. Protective helmets, toys and automobile parts are made from this plastic which in short form is referred to as "ABS" What does "ABS" stand for? **ACRYLIC BUTADIENE STYRENE.**
40. Now with consciousness for preserving and protecting our environment, newer kinds of plastics are being formulated that can be attacked by microbes and broken down to cellulose. What is the name given to such plastics? **BIO DEGRADABLE PLASTICS**
41. An important class of polymers are polyamides. What is their common name? **NYLON**
42. What is the polymer in the packing material thermocole? **POLYSTYRENE**
43. A very widely used polymer is Polymethyl methacrylate. How is it otherwise called? **PERSPEX**

- 44 Which thermosetting material is used for making tableware? **MELAMINE FORMALDEHYDE.**
- 45 What is the name of the plastic fibre of which bullet proof vests are made? **KEVLAR**
- 46 What is the common name for the construction material that is a combination of calcite and clay? **PORTLAND CEMENT**
- 47 Name the mineral in the gem JADE. **SODIUM ALUMINIUM SILICATE, $\text{NaAlSi}_3\text{O}_8$**
- 48 What is the common name for the mineral $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$? **GYPSUM**
- 49 Name the process by which metals heated to higher temperature and cooled rapidly in water, air, molten or fused salts for the purpose of hardening. **QUENCHING**
- 50 What is gun metal? **BRONZE (88 % Cu, 10 % Sn and 2 % Zn)**
- 51 Name the metal widely used in aerospace industry and named after Greek mythology hero? **TITANIUM**
- 52 This Al Cu alloy denoted by 2014, used predominantly in aerospace industry? **DURALUMIN**
- 53 Springs are used to absorb motion or energy and balance the mechanical loads in a system. This element is commonly added to spring steel? **SILICON**
- 54 The Tarapur Atomic Power Plant is located in this state **MAHARASHTRA**
- 55 Where is the oldest oil well in India located? **DIGBOI (ASSAM)**
- 56 He is the prime architect of the Indian Nuclear Programme? **HOMI JEHRANGIR BHABA**
- 57 An American rolling mill company first produced commercially very pure iron. What is the name given to this pure iron? **ARMCO IRON**
- 58 The names LINZ and DONAVITZ are associated with the production of which material? **STEEL**
- 59 One of the figurines excavated near Mohenjo-daro is the "DANCING GIRL". What is it made of? **BRONZE**
- 60 This metal was formerly known as Glucinum, meaning sweet owing to the sweet taste of its salts but its present name was derived from one of its minerals. What is this Metal? **BERYLLIUM**
- 61 The expansion of the acronym MRI is: **MAGNETIC RESONANCE IMAGING**
- 62 Francium is named after France. Name one more element, which derives its name from France? **GALLIUM**
- 63 What are SIALONS? **CERAMIC**
- 64 What makes stainless steel stainless? **ADDITION OF CHROMIUM**
- 65 What is Rayon? **A general name for artificial silk.**
- 66 What is ALNICO and what is its application? **It is a permanent magnetic material, composed of aluminium, nickel and cobalt.**
- 67 Why Dolomite is added along with the charge in blast furnace? **TO FLUX SILICEOUS IMPURITIES AS SLAG.**
- 68 We know about normal process cooling. What is Super cooling? **COOLING OF LIQUID BELOW ITS NORMAL FREEZING POINT.**
- 69 We know normal electrical conductivity as the ability of the material to carry current. What is super conductivity? **REFERS TO ZERO RESISTANCE FOR CONDUCTING ELECTRICITY.**
- 70 Name the element, which finds extensive application in photocopying? **SELENIUM**
- 71 Alloy refers to a phase with more than one element. What is a super alloy? **AN ALLOY WITH SUPERIOR MECHANICAL PROPERTIES AT HIGH TEMPERATURES.**
- 72 Crystal structure refers to arrangement of atoms in a lattice. What is a super lattice?
WHEN MORE THAN ONE TYPE OF ATOMS ARE PRESENT, AND WHEN DISTINCT ATOMS OCCUPY DISTINCT POSITIONS, THE RESULTING LATTICE IS CALLED SUPER LATTICE.
- 73 Atomic Packing Factor of Hexagonal close packed Crystal is? **0.74**
- 74 The most common colour of the gemstone Topaz is ? **Yellow**
- 75 Sphalerite is an ore of ? **Zinc**

76. The wavelength of light can be experimentally found using:

A	Ripple Tank	B	Diffraction Grating	C	Plane Mirror	D	Glass Prism
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77. A transformer steps up the voltage from 220 Volts to 11,000 Volts. If the primary has 100 turns the secondary should have _____ turns? (Answer = $(11,000 / 220) \times 100 = 5000$)

A	5000	B	500	C	50	D	50000
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78. In a Germanium Crystal the inter atomic bonds are:

A	Ionic	B	Metallic	C	Van der Waals	D	Covalent
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79. A compound alloy of metals A and B has a unit cell containing A atoms at the corners and B atoms at the face centres of the FCC structure. What would be the formula for the compound?

A	AB	B	AB_3	C	AB_2	D	A_2B
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80. A wire of length 2 m is redrawn to a length of 4 m. Then its resistance will:

A	Decrease to $\frac{1}{4}$ of original	B	Double	C	Increase four times	D	Does not change
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81. At the magnetic equator the angle of dip would be:

A	0°	B	90°	C	180°	D	45°
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82. The SI units of magnetic field is:

A	Gauss	B	Oersted	C	Tesla	D	Pascal
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83. The activity of a radioactive sample decreases to one third of its original intensity (I_0) in 9 years. After a further period of 9 years, its activity would be:

A	Same	B	$I_0 / 6$	C	$I_0 / 4$	D	$I_0 / 9$
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84. The unit of Planck's constant is:

A	Nm	B	eV	C	Js^{-1}	D	Js
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85. An example of a dia - magnetic substance is:

A	Aluminium	B	Copper	C	Antimony	D	Cobalt
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86. Poisonous gas present in the exhaust fume of a car is:

A	CH_4	B	C_2H_2	C	CO	D	CO_2
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87. Carborundum is the commercial name of:

A	Al_2O_3	B	$Ca(H_2PO_4)_2$	C	H_3PO_4	D	SiC
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88. During the daytime, plants absorb:

A	Carbon dioxide	B	Carbon monoxide	C	Nitrogen	D	Oxygen
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89. Which of the following forms of carbon finds use in the sugar industry?

A	Animal charcoal	B	Sugar charcoal	C	Lamp black	D	Wood charcoal
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90. Iron is rendered passive by treatment with concentrated:

A	H ₂ SO ₄	B	H ₃ PO ₄	C	HCl	D	HNO ₃
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91. Melting point of an alloy is normally

A	Less than pure metal	B	More than pure metal	C	Same as pure metal	D	Dependent on the base metal and alloy
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92. In the extraction of iron, the furnace charge consists of iron ore coke and limestone. The function of limestone is to act as:

A	An oxidiser	B	A deoxidiser	C	Flux	D	Slag
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93. This is a measure of toughness of a material?

A	Tensile Strength	B	Yield Strength	C	Creep Strength	D	Impact Strength
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94. The anode mud obtained during electrolytic refining of copper contains:

A	Iron	B	Nickel	C	Silver	D	Zinc
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95. Aluminium is not present in the mineral:

A	Cryolite	B	Feldspar	C	Fluorspar	D	Mica
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96. PVC has the repeating unit of:

A	Acrylonitrile	B	Ethylene	C	Tetrafluoroethylene	D	Vinyl Chloride
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97. Bakelite is manufactured by the reaction between:

A	Ethylene glycol and Phthalic acid	B	Melamine and Formaldehyde	C	Phenol and Formaldehyde	D	Urea and Formaldehyde
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98. Terylene is the polyester of:

A	Ethylene glycol and phthalic acid	B	Hexa-methylene diamine & Adipic acid	C	Phenol and for diamine & Adipic acid	D	Urea and formaldehyde maldehyde
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99. A raw material used in making nylon is:

A	Adipic acid	B	Butadiene	C	Ethylene	D	Methyl methacrylate
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100. Chemically considering, digestion is basically:

A	Hydrolysis	B	Anabolism	C	Hydrogenation	D	Dehydrogenation
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Answers

76 B 77 A 78 D 79 B 80 C 81 A 82 C 83 D 84 D 85 B 86 C 87 D 88 A
89 A 90 D 91 A 92 C 93 D 94 C 95 C 96 D 97 C 98 A 99 A 100 A

"Education is not the filling of a pail, but the lighting of a fire."

William Butler Yeats



TMAQ 09 - ENTHUSIASM AT ITS BEST

Hearty Welcome
STATE BANK OF INDIA
NEW FACTORIES
THE INDIAN INSTITUTE OF METALS
TMAQ

NEW FROM EMPLOYERS
The new from employers is a new initiative by the State Bank of India to provide financial support to the small and medium enterprises (SMEs) in the form of loans and grants.

THE INDIAN INSTITUTE OF METALS
TMAQ
The Indian Institute of Metals (IIM) is a leading research and development organization in the field of metallurgy and materials science. It is a part of the State Bank of India (SBI) group of institutions.