



IITJMU/RTI-A/2023/09  
Dated: 15/09/2023

**ORDER**

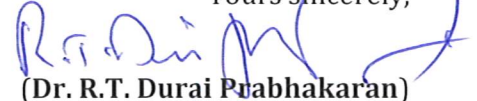
**Sub: - 1<sup>st</sup> Appeal filed by Sh. Asutya Kumar Biswal under Right to Information Act, 2005-reg.**

1. Sh. Asutya Kumar Biswal had filed an RTI Application No. IITJK/R/E/23/00055 dated 23/07/2023 under RTI Act, 2005 seeking information on various points. Sh. Asutya Kumar Biswal, has now filed the 1<sup>st</sup> RTI Appeal vide No. IITJK/A/E/23/00009 dated 24/08/2023.
2. As per the records available and based thereon, the requested information is as follows.

S.No	Questions	Reply
1.	1. The exam was on 2nd Dec 2022, not on 1st Jan 2021 mentioned in the reply document 2. The total number of questions asked is 50, not 60 mentioned in the reply document. 3. All questions are technical questions, not any non-technical questions.	Copy of Question paper is attached as Annexure - A
2.	4. Skill test marks or qualified or not qualified not given in the reply	Additional information sought in the first appeal
3.	5. Please clearly mention the marking criteria of the written	Additional information sought in the first appeal

3. The appeal filed by Sh. Asutya Kumar Biswal is disposed of herewith.
4. Second, Appeal against this order, if any, may be preferred, within 90 days with Central Information Commission, Room No. 213, Baba Gang Nath Marg Munirka, New Delhi - 110067.

Yours sincerely,



**(Dr. R.T. Durai Prabhakaran)**

First Appellate Authority (RTI)

Indian Institute of Technology Jammu

**Dr. R.T. Durai Prabhakaran**

**First Appellate Authority (RTI)**

**Indian Institute of Technology Jammu**

**Sh. Asutya Kumar Biswal,**  
Room NO-310, Powder Metallurgy Lab,  
MSME Department, IIT Hyderabad,  
Sangareddy Telangana (India)  
Mobile No: +91-7008629432  
Email ID: asutya.igit@gmail.com

Copy to :

1. CPIO/PIO, Indian Institute of Technology Jammu
2. Incharge webmaster with the remarks to upload the same on Institute website.

# JTS\_MT\_02122022

## Assessment outcomes

Pass 30 - 100

**Block 1, 60 question(s), maximum score 240**

### Question Block - 1

1. There will be 25% negative marking. For each correct answer +4 and incorrect answer -1 mark will be awarded.
2. You have 45 minutes for this online Examination.
3. Total number of questions in this exam are 60.
4. All questions carry equal marks.
5. Your answers will be automatically saved at every 30 seconds.
6. Answers can be changed anytime before final submission.
7. If you do not want to attempt any question, please select Do not want to attempt option and no marks will be awarded.
8. Do not press the submit button till you have completed all the questions.

1 of 60

Question Description: Eutectic modification of Al-Si alloys uses which elements?

Question ID: 100011242997

Eutectic modification of Al-Si alloys uses which elements?

- (a) ☐ Fe
- (b) ☐ Ge
- (c) ☐ Na
- (d) ☐ Mg
- (e) ☐ Do not wish to attempt

### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

2 of 60

Question Description: An FCC pure metal has how many atoms per unit cell?

Question ID: 100011242998

An FCC pure metal has how many atoms per unit cell?

- (a) ☐ 4
- (b) ☐ 8
- (c) ☐ 12
- (d) ☐ 6
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

3 of 60

Question Description: Which of the following is an equilibrium thermodynamic defect?

Question ID: 100011242999

Which of the following is an equilibrium thermodynamic defect?

- (a) ☐ Vacancies
- (b) ☐ Dislocations
- (c) ☐ Grain boundaries
- (d) ☐ Free surface
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

4 of 60

Question Description: Production of nodular cast iron involves addition of which element to the melt?

Question ID: 100011243000

Production of nodular cast iron involves addition of which element to the melt?

- (a) ☐ Ti
- (b) ☐ Mg
- (c) ☐ Mn
- (d) ☐ Si
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect

- ♦ If choice e is selected, set score to 0.  
That is incorrect

5 of 60

Question Description: Which of these is a practical strengthening mechanism?

Question ID: 100011243001

Which of these is a practical strengthening mechanism?

- (a) ☐ Precipitation hardening
- (b) ☐ Solid solution strengthening
- (c) ☐ Cold working
- (d) ☐ All of these.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to 4.  
That is correct
- ♦ If choice e is selected, set score to 0.  
That is incorrect

6 of 60

Question Description: Which is desired for best creep properties?

Question ID: 100011243002

Which is desired for best creep properties?

- (a) ☐ Nanocrystalline grains
- (b) ☐ Micron-sized grains
- (c) ☐ Single crystal
- (d) ☐ None of these.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to 4.  
That is correct
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

7 of 60

Question Description: The martensitic transformation in steels

Question ID: 100011243003

The martensitic transformation in steels

- (a) ☐ Involves diffusion of Fe atoms alone

- (b) ☐ Involves diffusion of C atoms alone
- (c) ☐ Involves diffusion of both Fe and C atoms
- (d) ☐ Is diffusionless.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

8 of 60

Question Description: 8. Suppose you are asked to synthesise Mg-based alloys. Which of the following techniques is not desirable to use for this purpose?

Question ID: 100011243004

8. Suppose you are asked to synthesise Mg-based alloys. Which of the following techniques is not desirable to use for this purpose?

- (a) ☐ Induction melting under He atmosphere
- (b) ☐ Induction melting under Ar atmosphere
- (c) ☐ Arc melting under Ar atmosphere
- (d) ☐ All of these
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

9 of 60

Question Description: In selecting a material with high resilience, which Ashby material property chart would you use?

Question ID: 100011243005

In selecting a material with high resilience, which Ashby material property chart would you use?

- (a) ☐ Strength-density chart
- (b) ☐ Strength-modulus chart
- (c) ☐ Modulus-density chart
- (d) ☐ Strength-fracture toughness chart
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

10 of 60

Question Description: Heterogeneous nucleants are primarily added to melts for

Question ID: 100011243006

Heterogeneous nucleants are primarily added to melts for

- (a) ☐ Grain size refinement
- (b) ☐ Single crystal growth
- (c) ☐ Increasing cooling rate
- (d) ☐ Lowering melting point
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to 4.  
That is correct
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

11 of 60

Question Description: Which of the following would have better machinability?

Question ID: 100011243007

Which of the following would have better machinability?

- (a) ☐ High C martensitic steel
- (b) ☐ Medium C martensitic steel
- (c) ☐ Hadfield steel
- (d) ☐ Grey cast iron
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect

- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

12 of 60

Question Description: Which of the following is unsuitable for detecting internal cracks in a component?

Question ID: 100011243008

Which of the following is unsuitable for detecting internal cracks in a component?

- (a) ☐ Radiography
- (b) ☐ Ultrasonic testing
- (c) ☐ Dye-penetrant testing
- (d) ☐ None of the above.
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

13 of 60

Question Description: Thermal expansion of materials arises from

Question ID: 100011243009

Thermal expansion of materials arises from

- (a) ☐ Asymmetry of potential energy-interatomic distance curve
- (b) ☐ Weak bonds
- (c) ☐ Strong bonds
- (d) ☐ Thermal vibrations
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

14 of 60

Question Description: Which of the following would you use for best electrical conductivity?

Question ID: 100011243010



Which of the following would you use for best electrical conductivity?

- (a) ☐ Ni
- (b) ☐ Fe
- (c) ☐ Cr
- (d) ☐ Ag
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

15 of 60

Question Description: In an SEM, the back-scattered electron mode is used for

Question ID: 100011243011

In an SEM, the back-scattered electron mode is used for

- (a) ☐ Topographic contrast
- (b) ☐ Compositional contrast
- (c) ☐ EDX chemical analysis
- (d) ☐ None of these.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

16 of 60

Question Description: Which of the following properties of a single crystal is independent of the loading direction?

Question ID: 100011243012

Which of the following properties of a single crystal is independent of the loading direction?

- (a) ☐ Tensile strength
- (b) ☐ Yield strength
- (c) ☐ Young's modulus
- (d) ☐ Critical resolved shear stress

(e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

17 of 60

Question Description: Strength of a metal at room temperature usually increases with which of the following?

Question ID: 100011243013

Strength of a metal at room temperature usually increases with which of the following?

- (a) ☐ Reducing grain size
- (b) ☐ Increasing grain size
- (c) ☐ Increased vacancy concentration
- (d) ☐ None of these
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

18 of 60

Question Description: Which of the following is used for compositional analysis in a TEM?

Question ID: 100011243014

Which of the following is used for compositional analysis in a TEM?

- (a) ☐ Bright field imaging
- (b) ☐ Dark-field imaging
- (c) ☐ High resolution imaging
- (d) ☐ EELS
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect

- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

19 of 60

Question Description: Which of the following is a method for TEM specimen preparation

Question ID: 100011243015

Which of the following is a method for TEM specimen preparation

- (a) ☐ Shot peening
- (b) ☐ Dimpling
- (c) ☐ Lathe machining
- (d) ☐ WDX
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

20 of 60

Question Description: Thermal analysis techniques (e.g. DSC) of materials characterisation can be based on a change in which material property?

Question ID: 100011243016

Thermal analysis techniques (e.g. DSC) of materials characterisation can be based on a change in which material property?

- (a) ☐ Modulus
- (b) ☐ Reflectivity
- (c) ☐ Density
- (d) ☐ Specific Heat
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

21 of 60

Question Description: A tensile stress-strain curve directly tells us which of the following?

Question ID: 100011243017

A tensile stress-strain curve directly tells us which of the following?

- (a) ☐ Wear resistance
- (b) ☐ Poisson's ratio
- (c) ☐ Young's modulus
- (d) ☐ Impact toughness
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

22 of 60

Question Description: A phase diagram does not tell us which of the following?

Question ID: 100011243018

A phase diagram does not tell us which of the following?

- (a) ☐ Time taken for transformation
- (b) ☐ Liquidus temperature
- (c) ☐ Solidus temperature
- (d) ☐ Equilibrium phases
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

23 of 60

Question Description: Melting of a pure metal is a reaction of which type?

Question ID: 100011243019

Melting of a pure metal is a reaction of which type?

- (a) ☐ Exothermic
- (b) ☐ Endothermic
- (c) ☐ Can be either endothermic or exothermic

- (d) ☐ None of these
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

24 of 60

Question Description: Ductile fracture in metals is associated with which of the following?

Question ID: 100011243020

Ductile fracture in metals is associated with which of the following?

- (a) ☐ Cleavage facets
- (b) ☐ Low plasticity
- (c) ☐ Microvoid coalescence
- (d) ☐ Low energy absorption
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to 4.  
That is correct
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

25 of 60

Question Description: A glass transition is a phase transition of which order?

Question ID: 100011243021

A glass transition is a phase transition of which order?

- (a) ☐ 1st order
- (b) ☐ 3rd order
- (c) ☐ 2nd order
- (d) ☐ None of the above.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect

- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

26 of 60

Question Description: The fracture stress of a brittle material is

Question ID: 100011243022

The fracture stress of a brittle material is

- (a) ☐ Proportional to crack size
- (b) ☐ Inversely proportional to crack size
- (c) ☐ Proportional to square root of crack size
- (d) ☐ Inversely proportional to square root of crack size
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

27 of 60

Question Description: Which of the following would you recommend for electrical insulation?

Question ID: 100011243023

Which of the following would you recommend for electrical insulation?

- (a) ☐ Cu
- (b) ☐ Porcelain
- (c) ☐ Al
- (d) ☐ Steel
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

28 of 60

Question Description: Which etchant is best for optical microscopy of Al alloys?

Question ID: 100011243024

Which etchant is best for optical microscopy of Al alloys?

- (a) ☐ Nital
- (b) ☐ HF based
- (c) ☐ Picral
- (d) ☐ FeCl<sub>3</sub> containing etchant
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

29 of 60

Question Description: Which of the following causes hot shortness in steels?

Question ID: 100011243025

Which of the following causes hot shortness in steels?

- (a) ☐ FeS
- (b) ☐ MnS
- (c) ☐ Fe 3 C
- (d) ☐ Cr 23 C 6
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

30 of 60

Question Description: What is the wavelength of Cu K $\alpha$  radiation used in X-ray diffraction?

Question ID: 100011243026

What is the wavelength of Cu K $\alpha$  radiation used in X-ray diffraction?

- (a) ☐ 1.86 Å
- (b) ☐ 1.39 Å
- (c) ☐ 1.789 Å

- (d) ☐ 1.54 Å  
(e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

31 of 60

Question Description: Polymer used for bullet proof shield application

Question ID: 100011243027

Polymer used for bullet proof shield application

- (a) ☐ Polycarbonate  
(b) ☐ Polystyrene  
(c) ☐ Polyethylene  
(d) ☐ Polypropylene  
(e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

32 of 60

Question Description: DSC can measure different thermal property. Select the correct answer

Question ID: 100011243028

DSC can measure different thermal property. Select the correct answer

- (a) ☐ softening temperature  
(b) ☐ glass transition temperature  
(c) ☐ degradation temperature  
(d) ☐ none of the above  
(e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect



- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

33 of 60

Question Description: Sample preparation of polymers for SEM analysis require

Question ID: 100011243029

Sample preparation of polymers for SEM analysis require

- (a) ☐ insulating channel
- (b) ☐ conducting channel using Cu grid
- (c) ☐ conducting channel using carbon tape
- (d) ☐ none of the above
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

34 of 60

Question Description: TEM sample preparation tool for polymers

Question ID: 100011243030

TEM sample preparation tool for polymers

- (a) ☐ FIB
- (b) ☐ ultramicrotome
- (c) ☐ spincoated sample
- (d) ☐ bulk sample
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

35 of 60

Question Description: Select semi-crystalline polymers

Question ID: 100011243031

Select semi-crystalline polymers

- (a) ☐ PVDF
- (b) ☐ LDPE
- (c) ☐ PMMA
- (d) ☐ PS
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to 4.  
That is correct
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

36 of 60

Question Description: Which method should be opted to analyse surface morphology of thin films?

Question ID: 100011243032

Which method should be opted to analyse surface morphology of thin films?

- (a) ☐ TEM
- (b) ☐ SEM
- (c) ☐ AFM
- (d) ☐ XRD
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to 4.  
That is correct
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

37 of 60

Question Description: For a polymer to be electrically conducting in nature, which property should it possess?

Question ID: 100011243033

For a polymer to be electrically conducting in nature, which property should it possess?

- (a) ☐ exhibit phonon transport
- (b) ☐ lone electron

- (c) ☐ delocalized electron pair
- (d) ☐ conjugated bond, delocalized electron pair
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to 4.  
That is correct
- ♦ If choice e is selected, set score to 0.  
That is incorrect

38 of 60

Question Description: Which polymer will exhibit brittle behaviour under tensile loading

Question ID: 100011243034

Which polymer will exhibit brittle behaviour under tensile loading

- (a) ☐ nitrile rubber
- (b) ☐ polyethylene
- (c) ☐ epoxy
- (d) ☐ polystyrene
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to 4.  
That is correct
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

39 of 60

Question Description: Units of thermal conductivity are

Question ID: 100011243035

Units of thermal conductivity are

- (a) ☐ J/kg.K
- (b) ☐ J/mol.K
- (c) ☐ J.ohm/sec.K<sup>2</sup>
- (d) ☐ W/m.K
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.

That is incorrect

- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

40 of 60

Question Description: The transition from the ferromagnetic to the paramagnetic state is named after  
Question ID: 100011243036

The transition from the ferromagnetic to the paramagnetic state is named after

- (a) ☐ Curie
- (b) ☐ Curie–Weiss
- (c) ☐ Neel
- (d) ☐ Debye
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

41 of 60

Question Description: The potential of a galvanic cell of copper (potential of +0.34 V) and aluminium (potential of –1.66 V) is  
Question ID: 100011243037

The potential of a galvanic cell of copper (potential of +0.34 V) and aluminium (potential of –1.66 V) is

- (a) ☐ 2.00 V
- (b) ☐ –1.32 V
- (c) ☐ 1.32 V
- (d) ☐ 0 V
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect

- If choice e is selected, set score to 0.  
That is incorrect

42 of 60

Question Description: If the product phase does not wet at all the parent phase, the contact angle between the two phases is

Question ID: 100011243038

If the product phase does not wet at all the parent phase, the contact angle between the two phases is

- (a) ☐ 0°
- (b) ☐ 180°
- (c) ☐ 6.8°
- (d) ☐ 90°
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

43 of 60

Question Description: Which of the following steels is mostly used for carburizing?

Question ID: 100011243039

Which of the following steels is mostly used for carburizing?

- (a) ☐ Stainless steels
- (b) ☐ 0.6% C steel
- (c) ☐ Tool steels
- (d) ☐ 0.2% C steel
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

44 of 60

Question Description: The band gap in Si is

Question ID: 100011243040

The band gap in Si is

- (a) ☐ 2.5 eV
- (b) ☐ 0.5 eV
- (c) ☐ 1.1 eV
- (d) ☐ 4.2 eV
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to 4.  
That is correct
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

45 of 60

Question Description: In steady state creep the strain rate

Question ID: 100011243041

In steady state creep the strain rate

- (a) ☐ Is constant and maximum
- (b) ☐ Is constant and minimum
- (c) ☐ Increases
- (d) ☐ Decreases
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

46 of 60

Question Description: Which rule would you use for calculating phase fractions in the two-phase region of a phase diagram?

Question ID: 100011243042

Which rule would you use for calculating phase fractions in the two-phase region of a phase diagram?

- (a) ☐ 1-2-1 rule
- (b) ☐ Lever Rule
- (c) ☐ Gibbs Phase rule
- (d) ☐ Fick's laws
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

47 of 60

Question Description: Which of the following does not enhance the fracture resistance of steels?

Question ID: 100011243043

Which of the following does not enhance the fracture resistance of steels?

- (a) ☐ Grain refinement
- (b) ☐ Increasing sulphur content
- (c) ☐ Increasing Mn content
- (d) ☐ None of these.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

48 of 60

Question Description: Wear resistance of a material depends upon

Question ID: 100011243044

Wear resistance of a material depends upon

- (a) ☐ Hardness alone
- (b) ☐ Hardness and toughness
- (c) ☐ Toughness alone
- (d) ☐ None of these
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.

That is incorrect

- If choice e is selected, set score to 0.

That is incorrect

49 of 60

Question Description: CuAl<sub>2</sub> phase in Al-Cu alloys relates to which strengthening mechanism?

Question ID: 100011243045

CuAl<sub>2</sub> phase in Al-Cu alloys relates to which strengthening mechanism?

- (a) ☐ martensitic transformation
- (b) ☐ Cold working
- (c) ☐ None of these
- (d) ☐ Precipitation hardening
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

50 of 60

Question Description: Which of the following is best suited for texture measurement?

Question ID: 100011243046

Which of the following is best suited for texture measurement?

- (a) ☐ X-ray diffraction
- (b) ☐ Optical microscopy
- (c) ☐ EDX
- (d) ☐ Tensile testing
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

51 of 60

Question Description: Which technique is ideally suited to measure hardness of Al thin films less than 3 microns thick?

Question ID: 100011243047



Which technique is ideally suited to measure hardness of Al thin films less than 3 microns thick?

- (a) ☐ Nanoindentation
- (b) ☐ Vickers hardness tests (30 kg load)
- (c) ☐ HRC rockwell hardness
- (d) ☐ Brinell macrohardness (30 kg load)
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to 4.  
That is correct
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

52 of 60

Question Description: Green compacts in powder processing refer to

Question ID: 100011243048

Green compacts in powder processing refer to

- (a) ☐ Sintered samples
- (b) ☐ Unsintered samples
- (c) ☐ green coloured samples
- (d) ☐ All of these
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

53 of 60

Question Description: Suppose you are given a task of having high surface wear resistance and also high core toughness in a component. Which material and/or process would you recommend?

Question ID: 100011243049

Suppose you are given a task of having high surface wear resistance and also high core toughness in a component. Which material and/or process would you recommend?

- (a) ☐ High C steel, hardened and tempered
- (b) ☐ Martensitic stainless steel
- (c) ☐ Nodular cast iron
- (d) ☐ Low C steel, carburized

(e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect

54 of 60

Question Description: Calculate the density of the sample if, the weight of sample in air was 40.00 g and weight of sample in water was 30.00 g as observed using Archimedes density measurement setup. Assume density of water as 1 g/cm<sup>3</sup> and density of air as negligible.

Question ID: 100011243050

Calculate the density of the sample if, the weight of sample in air was 40.00 g and weight of sample in water was 30.00 g as observed using Archimedes density measurement setup. Assume density of water as 1 g/cm<sup>3</sup> and density of air as negligible.

- (a) ☐ 3 g/cm<sup>3</sup>
- (b) ☐ 4 g/cm<sup>3</sup>
- (c) ☐ 5 g/cm<sup>3</sup>
- (d) ☐ 10 g/cm<sup>3</sup>
- (e) ☐ Do not wish to attempt

**Outcomes:**

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

55 of 60

Question Description: Suppose you are on the field and quickly need to estimate the approximate yield strength of a failed component. Which method will be quickest?

Question ID: 100011243051

Suppose you are on the field and quickly need to estimate the approximate yield strength of a failed component. Which method will be quickest?

- (a) ☐ Machine samples and send them for tensile testing
- (b) ☐ Cut a piece from the component and test it using Vickers hardness tests.
- (c) ☐ Any one of these methods will do.
- (d) ☐ Use a Poldi or rebound hardness tester.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to -1.  
That is incorrect
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to 4.  
That is correct
- ♦ If choice e is selected, set score to 0.  
That is incorrect

56 of 60

Question Description: Suppose you need to urgently get an approximate idea of the C content in a steel component. Which method will you use in a fast-paced shop floor setting?

Question ID: 100011243052

Suppose you need to urgently get an approximate idea of the C content in a steel component. Which method will you use in a fast-paced shop floor setting?

- (a) ☐ Cut a sample and send it for SEM-WDX analysis
- (b) ☐ Use a grinder to do spark testing
- (c) ☐ Cut a sample and send it for optical emission spectroscopy
- (d) ☐ Cut a sample to do TEM-EELS analysis.
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to -1.  
That is incorrect
- ♦ If choice b is selected, set score to 4.  
That is correct
- ♦ If choice c is selected, set score to -1.  
That is incorrect
- ♦ If choice d is selected, set score to -1.  
That is incorrect
- ♦ If choice e is selected, set score to 0.  
That is incorrect

57 of 60

Question Description: How many grains per sq. inch a metal sample with ASTM grain size 8 is expected to show under a magnification of 100X?

Question ID: 100011243053

How many grains per sq. inch a metal sample with ASTM grain size 8 is expected to show under a magnification of 100X?

- (a) ☐ 128
- (b) ☐ 512
- (c) ☐ 49
- (d) ☐ 256
- (e) ☐ Do not wish to attempt

**Outcomes:**

- ♦ If choice a is selected, set score to 4.  
That is correct
- ♦ If choice b is selected, set score to -1.

That is incorrect

- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

58 of 60

Question Description: Quench-cracking of steels during heat treatment can be reduced through

Question ID: 100011243054

Quench-cracking of steels during heat treatment can be reduced through

- (a) ☐ faster cooling
- (b) ☐ martempering
- (c) ☐ quenching from a higher temperature
- (d) ☐ increasing prior austenitic grain size
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.  
That is incorrect

59 of 60

Question Description: Calculate the % reduction in area of a metallic material if the sample of initial diameter of 15 mm was reduced to 5 mm diameter after application of tensile stress.

Question ID: 100011243055

Calculate the % reduction in area of a metallic material if the sample of initial diameter of 15 mm was reduced to 5 mm diameter after application of tensile stress.

- (a) ☐ 50 %
- (b) ☐ 88.8 %
- (c) ☐ 66.60%
- (d) ☐ 8%
- (e) ☐ Do not wish to attempt

#### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to 4.  
That is correct
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to -1.  
That is incorrect
- If choice e is selected, set score to 0.

That is incorrect

60 of 60

Question Description: Calculate the Vickers hardness number if the diagonal length of the square impression is 1.4142 mm on applying the load of 100 kg using diamond pyramid indenter of  $136^\circ$  included angle.

Question ID: 100011243056

Calculate the Vickers hardness number if the diagonal length of the square impression is 1.4142 mm on applying the load of 100 kg using diamond pyramid indenter of  $136^\circ$  included angle.

- (a) ☐ 262.2
- (b) ☐ 65.5
- (c) ☐ 131.1
- (d) ☐ 92.7
- (e) ☐ Do not wish to attempt

### Outcomes:

- If choice a is selected, set score to -1.  
That is incorrect
- If choice b is selected, set score to -1.  
That is incorrect
- If choice c is selected, set score to -1.  
That is incorrect
- If choice d is selected, set score to 4.  
That is correct
- If choice e is selected, set score to 0.  
That is incorrect