MODEL QUESTIONS FOR ECET-2013

GENERAL SUBJECTS

MATHEMATICS

1. The maximum value of \(5 + 8\cos\theta + 6\sin\theta\) is \[\text{[ ]}\]
   1) 25  2) 19  3) 15  4) 5

2. The value of \(\cos^{10}\theta \cos^{50}\theta \cos^{70}\theta\) is \[\text{[ ]}\]
   1) \(\frac{\sqrt{3}}{4}\)  2) \(\frac{\sqrt{3}}{2}\)  3) \(\frac{\sqrt{3}}{6}\)  4) \(\frac{\sqrt{3}}{8}\)

3. If \(\sec2\theta = \frac{-2}{\sqrt{3}}\) then the general solution \(\theta\) is \[\text{[ ]}\]
   1) \(2n\pi \pm \frac{5\pi}{6}\)  2) \(n\pi \pm \frac{5\pi}{6}\)  3) \(n\pi \pm \frac{5\pi}{12}\)  4) \(2n\pi \pm \frac{\pi}{6}\)

4. The eccentricity of the ellipse \(3x^2 + 2y^2 = 6\) is \[\text{[ ]}\]
   1) \(\frac{1}{3}\)  2) \(\frac{1}{\sqrt{3}}\)  3) \(\frac{1}{4}\)  4) \(\frac{1}{2}\)

5. \(\int_0^1 \frac{x e^x}{(1+x)^2} dx = \) \[\text{[ ]}\]
   1) \(\frac{e-2}{2}\)  2) \(e-2\)  3) \(\frac{e-1}{2}\)  4) \(e-1\)

PHYSICS

1. If young’s modulus ‘Y’, surface tension ‘S’ and velocity ‘V’ are chosen as fundamental quantities, the dimensional formula for force is \[\text{[ ]}\]
   a. \(Y^{-5}V^{4}S^{6}\)
   b. \(Y^{3}V^{5}S^{5}\)
   c. \(Y^{-5}V^{4}S^{5}\)
   d. \(Y^{3}V^{4}S^{6}\)

2. A ballon moves up with constant velocity 10m/s. An object is dropped from it when it is at a height of 100 m above the ground. The distance between the object and the ballon after 5 sec is \((g=10m/s^2)\) \[\text{[ ]}\]
   a. 120 m
   b. 125 m
   c. 100 m
d. 150 m

3. The time period of an oscillating simple pendulum is ‘T’. If its length is increased by 5 cm then the time period is ‘T₁’ and the time period is ‘T₂’ if the length is reduced by 5 cm. The relationship among T, T₁, T₂

\[
\begin{align*}
\text{a. } T^2 &= T_1^2 + T_2^2 \\
\text{b. } T^2/2 &= T_1^2 + T_2^2 \\
\text{c. } 2T^2 &= T_1^2 + T_2^2 \\
\text{d. } 3T^2 &= T_1^2 + T_2^2
\end{align*}
\]

4. A gas is heated through 4 K in a closed vessel. If its pressure is increased by 0.8%, the initial temperature of the gas is

\[
\begin{align*}
\text{a. } 227 \text{ K} \\
\text{b. } 454 \text{ K} \\
\text{c. } 454 \text{ °C} \\
\text{d. } 227 \text{ °C}
\end{align*}
\]

5. If light travels through two media with velocities 2.5 \times 10^8 \text{ m/s} and 2 \times 10^8 \text{ m/s} respectively, the critical angle for the combination of the two media is

\[
\begin{align*}
\text{a. } \sin^{-1}(4/5) \\
\text{b. } \sin^{-1}(3/5) \\
\text{c. } \sin^{-1}(2/5) \\
\text{d. } \sin^{-1}(1/5)
\end{align*}
\]

**CHEMISTRY**

1. The normality of oxalic acid solution is found to be 0.05N. How many grams of oxalic acid is present in 100 ml of solution.

\[
\begin{align*}
\text{a) } 1.26 & \quad \text{b) } 12.6 & \quad \text{c) } 126 & \quad \text{d) } 0.126
\end{align*}
\]

2. Which of the following is responsible for temporary hardness of water

\[
\begin{align*}
\text{a) } \text{Ca CO}_3 & \quad \text{b) } \text{Ca Cl}_2 & \quad \text{c) } \text{Ca SO}_4 & \quad \text{d) } \text{Ca (HCO}_3\text{)}_2
\end{align*}
\]

3. The monomer of Rubber is----

\[
\begin{align*}
\text{a) } \text{Isoprene} & \quad \text{b) } \text{Propene} & \quad \text{c) } \text{Polyisoprene} & \quad \text{d) } \text{Bakelite}
\end{align*}
\]

4. Which one of the following is responsible for Global Warming

\[
\begin{align*}
\text{a) } \text{Particulate} & \quad \text{b) } \text{Carbon dioxide} & \quad \text{c) } \text{Hydrogen sulphide} & \quad \text{d) } \text{Nitrous Oxide}
\end{align*}
\]

**ENGINEERING SUBJECTS**

**CHEMICAL ENGINEERING**

1. Cast iron is a _________ material.

\[
\begin{align*}
\text{a) } \text{Malleable} & \quad \text{b) } \text{Ductile} & \quad \text{c) } \text{Tough} & \quad \text{d) } \text{Brittle}
\end{align*}
\]

2. The average molecular weight of air is

\[
\begin{align*}
\text{a) } 20 & \quad \text{b) } 24 & \quad \text{c) } 29 & \quad \text{d) } 80
\end{align*}
\]
3. In which of the following process, temperature is constant
   a) Isobaric                 b) Iso thermal  c) Adiabatic       d) Adiabatic compression
4. The absorptivity of a perfect black body is
   a) 0          b) 1                  c) 0.5                     d) 0.8
5. Ball mill is used for
   a) Attrition               b) Coarse grinding  c) Fine grinding        d) Crushing

CIVIL ENGINEERING

1. What is the Bending moment equation for a simply supported beam with uniformly
distributed load, ‘ω’ with a span of ‘l’
   a) $\frac{wl}{2}$                b) $\frac{wl^2}{8}$       c) $\frac{wl^2}{2}$       d) $\frac{wl^2}{4}$

2. What is a long column with load w and effective length l with span to effective depth
   ratio
   a) $> \frac{l}{12}$           b) $= \frac{l}{12}$           c) $< \frac{l}{12}$    d) $\geq \frac{l}{10}$

3. The Reduced bearing with W.C.B = 120°
   a) N 30° E                    b) S 60° E               c) N 30° W             d) S 30° W

4. What is the relation between $c_d$, $c_v$, $c_c$ with orifices
   a) $c_d = \frac{c_c}{c_v}$       b) $c_c = c_v \times c_d$    c) $c_d = c_c \times c_v$        d) $c_v = c_c \times c_d$

COMPUTER SCIENCE AND ENGINEERING

1. In a circular linked list, the insertion of a record involves modification of
   a. 3 pointers
   b. 4 pointers
   c. 2 pointers
   d. No pointers
2. Which of the following layer of OSI reference model deals with end to end
   communication
   a. Presentation layer
   b. Session layer
   c. Network layer
   d. Transport layer
3. Which of the following statements are true regarding java applet
   Statement I : An applet can be trusted always
   Statement II: An applet must be executed using browser
   Statement III: An applet is not able to access the files of the computer in which it runs.
   a. Statement I & II
   b. Statement I & III
   c. Statement II & III
   d. All of the above
ELECTRONICS AND COMMUNICATION ENGINEERING

1. The largest unsigned decimal number that can be represented in binary using 6 bits is
   a. 63
   b. 64
   c. 127
   d. 128

2. A 0-10mA Ammeter with 30Ω internal resistance is to be extended to measure up to 20mA. What value of Shunt resistance is to be connected?
   a. 10 Ω
   b. 20 Ω
   c. 30 Ω
   d. 60Ω

3. The maximum value of modulation index in amplitude modulation is
   a. 10
   b. 5
   c. Infinite
   d. 1

ELECTRICAL AND ELECTRONICS ENGINEERING

1. The period during which the power to the traction motor is cut-off is known as
   a) Cut-off period
   b) Free running
   c) Coasting
   d) Braking

2. The slow but continuous rotation of the energy meter even under no load is known as
   a) Rotation error
   b) Jumping error
   c) creeping error
   d) free run error

3. Which of the following is known as Universal gate?
   a) AND
   b) NAND
   c) OR
   d) NOT

ELECTRONICS AND INSTRUMENTATION ENGINEERING

1. Which of the following is the Bi-Directional flow meter?
   a) Orifice
   b) Venturi meter
   c) Electromagnetic Flow meter
   d) Pitot tube

2. Neutral Zone is equal to
   a) $\Delta e$
   b) $\Delta e/2$
   c) $2\Delta e$
   d) $\Delta^2 e$

3. Mass spectroscopy deals with
   a) Mass of ions
   b) m/e ratio of ions
   c) charge of ions
   d) nuclear charge

MECHANICAL ENGINEERING

1. Speed Control Valves are
   a. Flow Control Valves
   b. Pressure regulating Valves
c. Non – Return Valves
d. Direction Control Valves

2. A simply supported beam has a uniformly distributed load on it. The bending movement diagram is in the form of
   a. Rectangle
   b. Triangle
   c. Parabola
   d. Semicircle

3. The first law of Thermodynamics deals with conservation of
   a. Velocity
   b. Mass
   c. Momentum
   d. Energy

**METALLURGICAL ENGINEERING**

1. Rawmaterial for production of Aluminium is -------
   a) Bauxite  b) Cryolite  c) Alumina  d) Gibbsite

2. No of slip systems in FCC structure
   a) A. 12  b) 48  c) 16  d) 03

3. ASTM grain size is measured by ------formula
   a) A N=2 \(^{n-1}\)  b) n=2\(^{N-1}\)  c) N=2\(^{n-1}\)  d) n=2\(^{N-1}\)

4. In proximate analysis of coal_________ is determined.
   a) Hydrogen, Nitrogen, Oxygen & Carbon
   b) Moisture, ash, Volatile matter & carbon
   c) Hydrogen, ash, Oxygen & Carbon
   d) Sulphure, Moisture & Carbon.

5. In Iso-thermal process
   a) \(dp=0\)  b) \(dt=0\)  c) \(dq=0\)  d) \(dv=0\)

6. In LD Process Oxygen is released through the lance at a pressure of __________.
   a) 150-175 psi  b) 100-150 psi  c) 200-250 psi  d) <100 psi

**MINING ENGINEERING**

1. In the following gases which one is Poisonous?
   a) \(CH_4\)  b) \(CO_2\)  c) \(O_2\)  d) \(CO\)

2. For steeply inclined road ways which type of rope haulage is used.
   a) Direct rope haulage
   b) Endless rope haulage
   c) Gravity rope haulage
   d) Main and Tail rope haulage

3) Fissure vein deposits are
   a) Magmatic concentration deposits
b) Cavity filling deposits  
c) Sublimation deposits  
d) Residual concentration deposits

**CERAMIC TECHNOLOGY**

1. Zinc oxide in Glass Improves the Property of  
   a) Stabilizing  b) Fluxing  c) Opacifying  d) Reafractoriness

2. Fluorepar is added in Enamels as  
   a) Opacifier  b) Coloring Agent  c) Flux  d) Floating Agent

**BIO – TECHNOLOGY**

1. Living, unstained cells and organisms can be observed best using  
   a. Fluorescent microscopy  
   b. TEM  
   c. SEM  
   d. Phase contrast microscopy

2. A replicated chromosome consists of two very long strands of identical chromosomal material called  
   a. Teomeres  
   b. Chromatids  
   c. Centromers  
   d. Genes

3. Which of the following is a micronutrient?  
   a. Carbon  
   b. Manganes  
   c. Potassium  
   d. magnesium

**PHARMACY**

1. Ball mill works on the principle of  
   a. Impact  
   b. Attrition  
   c. Crushing  
   d. Both ‘a’ and ‘b’

2. B.C.G. Vaccine contains  
   a. Living culture  
   b. Non-living culture  
   c. Natural culture  
   d. None

3. Acacia is not used as  
   a. Diluent
b. Suspending agent
c. Emulsifying agent
d. Binder

**B.Sc (Mathematics)**

**MATHEMATICS**

1. Solution of $x \, dy - y \, dx = xy^2 \, dx$ is
   a. $\frac{x^2}{2} + \frac{x}{y} = c$
   b. $\frac{x^2}{2} + \frac{y^2}{2} = c$
   c. $x + y = c$
   d. $x^2 - y^2 = c$

2. The complimentary function of $(D^2 - 5D + 6)y = xe^{4x}$
   a. $y_c = c_1 e^{-2x} + c_2 e^{-3x}$
   b. $y_c = c_1 e^{2x} + c_2 e^{3x}$
   c. $y_c = c_1 \cos 2x + c_2 \sin 2x$
   d. $y_c = c_1 \cosh 2x + c_2 \sinh 2x$

3. The radius of the sphere $x^2 + y^2 + z^2 + 6x - 8y + 6 = 0$ is 6 then the value of the $t$ is
   a. 8
   b. 10
   c. 11
   d. 9

4. The No.of generators of a cyclic group of order 5
   a. 1
   b. 4
   c. 2
   d. 3

5. The left hand limit of $\lim_{x \to 0} \frac{3x + |x|}{7x - 5|x|}$ is
   a. $\frac{4}{5}$
   b. $\frac{3}{2}$
   c. $\frac{2}{7}$
   d. $\frac{1}{6}$

6. If $f(x) = x$ on $[0,1]$ and $P = \{0,1/3,2/3,1\}$ then $U[P,f]$ is
   a. $\frac{2}{3}$
   b. $\frac{1}{3}$
   c. $\frac{4}{3}$
   d. $\frac{5}{3}$

7. If $\vec{F} = xi + yj + zk$ then $\text{div} \, \vec{F}$ is
   a. 2
   b. 3
c. 0
d. 4

8. If S is the surface of the sphere \( x^2 + y^2 + z^2 = 1 \) then \( \int_S (axi + byj + czk) \cdot N \, dS \) is
   a. \( \frac{4\pi}{3} (a+b+c) \)
   b. \( \frac{2\pi}{3} (a+b+c) \)
   c. \( \frac{\pi}{3} (a+b+c) \)
   d. \( \frac{1}{3} (a+b+c) \)

9. Let \( T: V_2 \rightarrow V_3 \) be defined by \( T(x,y) = (x+y, 2x-y, 7y) \) then the matrix of \( T \) with respect to the standard bases of \( V_2 \) and \( V_3 \) is
   a. \[
   \begin{bmatrix}
   1 & 1 \\
   2 & -1 \\
   0 & 7
   \end{bmatrix}
   \]
   b. \[
   \begin{bmatrix}
   1 & 0 \\
   0 & 1 \\
   0 & 0
   \end{bmatrix}
   \]
   c. \[
   \begin{bmatrix}
   1 & 3 \\
   2 & 2 \\
   3 & 1
   \end{bmatrix}
   \]
   d. \[
   \begin{bmatrix}
   1 & 2 \\
   2 & 3 \\
   4 & 6
   \end{bmatrix}
   \]

10. If \( \alpha = (2,1,3), \beta = (1,2,3) \) are two vectors in an inner product space \( R^3 (R) \) then the inner product between \( \alpha \) and \( \beta \) is
    a. 13
    b. 12
    c. 11
    d. 10

**ANALYTICAL ABILITY**

I. Data Sufficiency

In questions 1-2 the choices are same as given below

(1) If the data I alone is sufficient to answer the question, then (1) is the correct answer.
(2) If the data II alone is sufficient to answer the question, then (2) is the correct answer.
(3) If the data I & II both are sufficient to answer the question, then (3) is the correct answer.
(4) If the data I & II both are not sufficient to answer the question, then (4) is the correct answer.

1. How far is town A from Town C?
I: Town A is 160 kms from town B. II: Town B is 155 kms from town C

2. If M and N are points on segment RS. What is the length of the segment MN?
   I: The length of segment RM is 10 II: The length of segment NS is 8

II.

   a) Sequence and Series:
   3. RTV, OQS, LNP, IKM, ____________
      (1) FHJ                    (2) GIK
      (3) GHJ                    (4) GIJ
   4. Find the missing term in the series 1,9,17,33,49,73, ________
      (1) 97                    (2) 98
      (3) 99                    (4) 100

   b) Data Analysis:-

   Note:- Answer questions 5 and 6 after reading the table

<table>
<thead>
<tr>
<th>Food Items</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>250</td>
<td>230</td>
<td>210</td>
<td>260</td>
<td>240</td>
<td>220</td>
</tr>
<tr>
<td>Wheat</td>
<td>320</td>
<td>340</td>
<td>280</td>
<td>290</td>
<td>300</td>
<td>360</td>
</tr>
<tr>
<td>Sugar</td>
<td>240</td>
<td>210</td>
<td>200</td>
<td>210</td>
<td>160</td>
<td>150</td>
</tr>
<tr>
<td>Pulses</td>
<td>360</td>
<td>300</td>
<td>320</td>
<td>245</td>
<td>235</td>
<td>250</td>
</tr>
<tr>
<td>Vegetables</td>
<td>380</td>
<td>390</td>
<td>385</td>
<td>375</td>
<td>355</td>
<td>370</td>
</tr>
<tr>
<td>Misc.</td>
<td>460</td>
<td>485</td>
<td>440</td>
<td>460</td>
<td>475</td>
<td>480</td>
</tr>
</tbody>
</table>

5. The quantity of sugar used in month of April is approximately what percent of the total of food items used in April.
   (1) 21%                    (2) 18%
   (3) 11%                    (4) 25%

6. What is the respective ratio of the total quantity of food items used in the month of March to the quantity of food items used in the month of April?
   (1) 366: 367                (2) 361: 365
   (3) 248:245                (4) 367:368

c) Coding and Decoding Problems:
7. If BELIEF is written as AFKKDI, then the code for SELDOM is
   (1) TFKENP                  (2) RFKFNLP
   (3) RKKENN                  (4) RDKCNLP

8. In a row of six persons D and C are immediate neighbors of E. B is a neighbor of A only. A is the forth from F who are on the two end points?
   (1) F,B                    (2) F,C
   (3) B,D                    (4) C,A

   COMMUNICATIVE ENGLISH
Sample

I want to buy __________ lap top
a) a b) an c) the d) none of the above

Will you please sit ________ me?
   a) beside b) by c) besides d) between

I ________ since morning.
   a) Am working b) was working c) worked d) have been working

It ________ to hold a meeting in the office today.
   a) is proposed b) proposed c) they proposed d) is proposing

Each of the boys ________ for the game show.
   a) Were called b) was called c) were calling d) are call

Farmers work on land to produce food for us, ________
   a) lsn’t it? B) doesn’t it? C) weren’t they? D) don’t they?

Examine
   a) Check b) cheque c) exact d) disclose

Analyse
   a) Synthesise b) co ordinate c) organise d) concise

One who is recovering from illness
   a) Sickness b) convalescent c) conduit d) ill-free

...relevant
   a) Un b) dis c) mis d) ir

________ is today’s newspaper.
   a) Hear b) her c) heir d) here

I invited everyone ___ Rahim to the party.
   a) Accept b) except c) exempt d) extinct

The father / along with his son were found /missing from the party/ held at the
A            B            C          D
Function hall.

Being a Sunday, I stayed at home.
   a) I am being the Sunday b) It being a Sunday c) When being the Sunday d) On being a Sunday

The workers are hell bent at getting what is due to them.
   a) hell bent on getting b)hell bent for getting c)hell bent upon getting d) No improvement

A passage of suitable level of difficulty may be given to test comprehension skills.

tomorrow? / to come with us/ to have dinner /Would you like
A       B       C       D
a) acdb   b) cd ba   c) deba   d) dbca

A: May I leave the room now Madam?
B: Yes you may.
   a) Requesting
   b) Seeking permission
   c) Apologising
d) Commanding