MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

NOVEMBER 2023

SUBJECT: CONSTRUCTION MATERIALS AND QUALITY MANAGEMENT [CIE 4053]

Date of Exam: **/11/2023** Time of Exam: – am/pm Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

<table>
<tr><th>Q. No</th><th>Question</th><th>Marks</th><th>CO</th><th>BL</th></tr>
<tr><td>1A</td><td>Discuss the functions of material management for i) Material procurement and ii) Material accounting.</td><td>3</td><td>1</td><td>2</td></tr>
<tr><td>1B</td><td>Develop a logical codification for the following material inventory using the Brisch system.
<table>
<tr><th>Sl. no</th><th>Material</th><th>Sl. no</th><th>Material</th></tr>
<tr><td>1</td><td>Coarse aggregate 20 mm</td><td>11</td><td>Standard sand-Grade II</td></tr>
<tr><td>2</td><td>Coarse aggregate 12 mm</td><td>12</td><td>Standard sand-Grade III</td></tr>
<tr><td>3</td><td>Crushed sand</td><td>13</td><td>ISA 50×50×5 mm</td></tr>
<tr><td>4</td><td>Solid Block 400×200×100 mm</td><td>14</td><td>ISA 50×50×6 mm</td></tr>
<tr><td>5</td><td>Solid Block 400×200×150 mm</td><td>15</td><td>ISA 65×65×6 mm</td></tr>
<tr><td>6</td><td>Cement OPC 43 Grade</td><td>16</td><td>Reinforcement Steel Fe 500 TMT 8 mm</td></tr>
<tr><td>7</td><td>Cement OPC 53 Grade</td><td>17</td><td>Reinforcement Steel Fe 500 TMT 10 mm</td></tr>
<tr><td>8</td><td>White Cement</td><td>18</td><td>Reinforcement Steel Fe 500 TMT 12 mm</td></tr>
<tr><td>9</td><td>River sand-coarse</td><td>19</td><td>PVC pipe 110 mm</td></tr>
<tr><td>10</td><td>Standard sand-Grade I</td><td>20</td><td>PVC pipe 160 mm</td></tr>
</table></td><td>4</td><td>1</td><td>3</td></tr>
<tr><td>1C</td><td>Discuss the need, objectives (any four), and methods of codification techniques.</td><td>3</td><td>2</td><td>2</td></tr>
<tr><td>2A</td><td>Compare VED and FSN selective control methods with relevant examples.</td><td>2</td><td>2</td><td>2</td></tr>
</table>

2B

Prepare a material plan for the activities listed on 01-12-2023. Assume a 7-day workweek and no other holidays. Assume all activities start together and any missing data suitably.

Sl. no	Description of work	Quantity	Productivity
1	PCC (1:4:8) for foundation	2 m^3	1 m^3/day
2	CC 1:2:4 for footings- 10 nos	5 m^3	2 m^3/day
3	1st class brick masonry up to lintel	30 m^3	5 m^3/day

PCC 1:4:8		
Material	**Unit**	**Quantity**
CA 20	m^3	0.96
Sand	m^3	0.48
Cement	bags	3.60

CC 1:2:4 for footing		
Material	**Unit**	**Quantity**
CA 20 mm	m^3	0.84
Sand-coarse	m^3	0.42
Cement	bags	8.00

1st class brick masonry up to lintel		
Material	**Unit**	**Quantity**
Bricks	Nos.	500
Sand	m^3	0.30
Cement	bags	1.50

3 **2** **3**

2C

Develop a control matrix using ABC and HML classification for the following material data.

Material code	Unit cost (×10^3 ₹)	Quantity consumed per annum (×10^3)
CM1	0.72	1.62
CM2	133.14	1.50
CM3	0.08	14.95
CM4	1.77	15.02
CM5	18.33	54.00
CM6	0.01	105.00
CM7	0.08	124.50
CM8	0.18	150.75
CM9	0.14	154.92
CM10	0.12	194.25

5 **2** **3**

3A

The table shows the time series of cement prices per bag for two years. Suggest a forecasting technique between the moving average and the exponential smoothening with N=3 and Alpha=0.2.

Year-1	393	386	384	386	398	371	354	383	392	389	388	375
Year-2	374	375	378	390	376	390	356	365	390	381	380	351

5 **3** **3**

3B	Discuss various traits and types of histogram.	**2**	**5**	**2**
3C	Discuss the techno-economic factors during the purchase of capital equipment.	**3**	**3**	**2**

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<table>
<tr><td>4A</td><td>Develop a purchase strategy using the hindsight approach for the price data in the table below. Compute the total expenditure for the project plan period. The project requires 100 monthly units, and the maximum inventory capacity is 300. Compare the expenditure with the conservative approach and comment on the outcome.
<table>
<tr><td>Month</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Price</td><td>318</td><td>315</td><td>340</td><td>318</td><td>313</td><td>320</td><td>342</td><td>384</td><td>318</td><td>318</td></tr>
<tr><td>Month</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr>
<tr><td>Price</td><td>318</td><td>325</td><td>325</td><td>349</td><td>321</td><td>317</td><td>319</td><td>331</td><td>337</td><td>357</td></tr>
</table></td><td>4</td><td>3</td><td>3</td></tr>
<tr><td>4B</td><td>Discuss the benefits of implementing quality function deployment (QFD).</td><td>2</td><td>5</td><td>2</td></tr>
<tr><td>4C</td><td>Using the internal rate of returns method, determine which equipment is more profitable at an internal rate of 10%. The salvage value is expected at 10%.
<table>
<tr><th>Equipment</th><th>Capital Investment (lakh ₹)</th><th>GAR (lakh ₹)</th><th>ADED (lakh ₹)</th><th>Useful life (years)</th></tr>
<tr><td>A</td><td>4.5</td><td>1.8, 1.9, 1.6, 1.5, 1.2</td><td>0.69, 0.6, 0.6, 0.51, 0.57</td><td rowspan="2">5</td></tr>
<tr><td>B</td><td>6.0</td><td>3.0, 3.2, 3.5, 3.9, 3.7</td><td>1.4, 1.5, 1.3, 1.5, 1.4</td></tr>
</table></td><td>4</td><td>3</td><td>3</td></tr>
<tr><td>5A</td><td>Discuss the appraisal and preventive costs in ‘cost of quality.’</td><td>3</td><td>4</td><td>2</td></tr>
<tr><td>5B</td><td>Discuss the PDCA cycle, citing its stages of implementation. Represent a typical House of Quality.</td><td>4</td><td>5</td><td>2</td></tr>
<tr><td>5C</td><td>Illustrate the economics of ‘quality of conformance.’</td><td>3</td><td>5</td><td>2</td></tr>
</table>