SLOT: B1

CLOSED BOOK

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST – II - WINTERSEMESTER 2019-2020

Programme Name & Branch: B. Tech. Mechanical Engineering

Course Code: MEE1034

Course Name: Statistical Quality Control

Faculty Name(s): Dr. Raviteja Buddala

Class Number(s):VL2019205002430 Exam Duration: 90 mins Maximum Marks: 50

General instruction(s): *Answer all the questions*

<table>
<tr><th>Sl. No.</th><th>Question</th><th>Mark</th></tr>
<tr><td>1.</td><td>The following data represents the results of inspection of friction stir welded parts. Construct a fraction defective chart for the variable sample size and give your inference.
<table>
<tr><td>Sample number</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>Number Inspected</td><td>200</td><td>217</td><td>230</td><td>300</td><td>302</td><td>311</td><td>322</td><td>305</td><td>308</td><td>303</td></tr>
<tr><td>Number rejected</td><td>2</td><td>3</td><td>4</td><td>8</td><td>3</td><td>7</td><td>3</td><td>6</td><td>5</td><td>3</td></tr>
<tr><td>Sample number</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>Number Inspected</td><td>300</td><td>330</td><td>298</td><td>290</td><td>318</td><td>250</td><td>340</td><td>333</td><td>310</td><td>320</td></tr>
<tr><td>Number rejected</td><td>4</td><td>3</td><td>6</td><td>4</td><td>8</td><td>7</td><td>4</td><td>7</td><td>4</td><td>8</td></tr>
</table></td><td>20</td></tr>
<tr><td>2.</td><td>The following table gives the container bursting strength data in 10 samples of five observations each. The customer purchasing these containers needs a minimum bursting strength of 199 N/m^2. The recommended minimum value of process capability ratio for one sided specification is 1.45. Analyze the process capability using a suitable control chart.
<table>
<tr><td>Sample</td><td colspan="5">Data</td></tr>
<tr><td>1</td><td>265</td><td>205</td><td>263</td><td>307</td><td>220</td></tr>
<tr><td>2</td><td>268</td><td>260</td><td>234</td><td>299</td><td>215</td></tr>
<tr><td>3</td><td>197</td><td>286</td><td>274</td><td>243</td><td>231</td></tr>
<tr><td>4</td><td>267</td><td>281</td><td>265</td><td>214</td><td>318</td></tr>
<tr><td>5</td><td>346</td><td>317</td><td>242</td><td>258</td><td>276</td></tr>
<tr><td>6</td><td>300</td><td>208</td><td>187</td><td>264</td><td>271</td></tr>
<tr><td>7</td><td>280</td><td>242</td><td>260</td><td>321</td><td>228</td></tr>
<tr><td>8</td><td>250</td><td>299</td><td>258</td><td>267</td><td>293</td></tr>
<tr><td>9</td><td>265</td><td>254</td><td>281</td><td>294</td><td>223</td></tr>
<tr><td>10</td><td>260</td><td>308</td><td>235</td><td>283</td><td>277</td></tr>
</table></td><td>15</td></tr>
<tr><td>3.</td><td>A company manufactures small iron rods of length (target mean) 10 centimeters with</td><td>15</td></tr>
</table>

standard deviation 1 centimeter. The following table contains the data of 20 samples with single observation each.

A. Setup the tabular Cusum for the following data. (10M)
B. Also plot the Cusum status chart.(5M)

Sample	1	2	3	4	5	6	7	8	9	10
length	9.03	11.47	10.51	9.40	10.08	9.37	10.62	10.31	8.52	10.84
Sample	11	12	13	14	15	16	17	18	19	20
length	10.90	9.33	12.29	11.50	10.60	11.08	10.38	11.62	11.31	10.52