

## ENGR6011 2024: Assessment 2

Using Finite Element Analysis, in ABAQUS software, solve the following problems and report the required information. Assume any relevant information while solving these problems and subsequently report them. Questions 1 and 2 carry equal weightage. The value of ID required to obtain your solution shall be derived from the table on pages 2 and 3. This value is unique for each student.

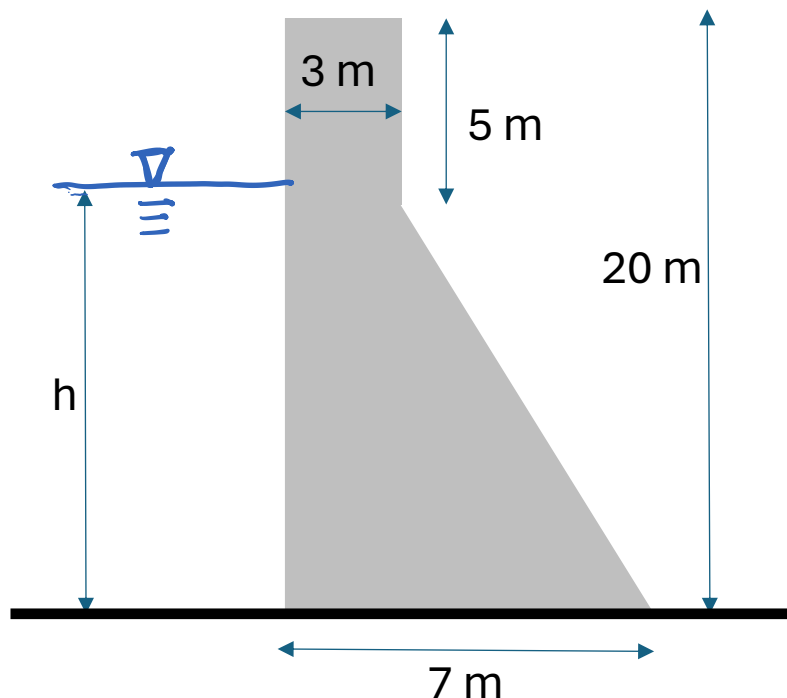
- (1) Western Australia has many “minor” bridges spans varying from around 2m to 10m. The bridges are built with Jarrah stringers typically of 400 mm diameter placed @ 1m centre to centre. Jarrah is an Australian hardwood with elastic constant (E) as 20GPa and Poisson ratio ( $\nu$ ) as 0.32. This bridge deck is seven metres wide made of 100 mm thick concrete. Consider a  $5\text{kN/m}^2$  live load on the deck. Model the stringer with 1D beam elements and 3D solid elements. Determine the displacement at the midspan of any interior stringer of bridges of spans  $l_1$  and  $l_2$ . Use three different meshes and compare the results with the theoretical solution.



$$l_1 = (1 + 0.02 * ID)m$$

$$l_2 = (5 + 0.05 * ID)m$$

- (2) A long concrete gravity dam across a river holds water up to a level 'h' in its downstream. Plot the stress distribution on this dam cross-section due to water pressure using a simple 2-D model. Consider  $h = 10 + 0.05 * ID$  m. Assume the dam is fixed to the ground and no seepage occurs under the dam section.



Please use the table below to locate your ID to solve the problems:

<b>Last Name</b>	<b>First Name</b>	<b>Student number</b>	<b>ID</b>
Abu	Mark Kervin	21396612	<b>1</b>
Acevedo Osma	Juan	22056713	<b>2</b>
Adhikari	Kamal	21925029	<b>3</b>
Ahmed	Uzair	21619652	<b>4</b>
Akula	Shailaja	21252578	<b>5</b>
Bajgain	Alina	21954324	<b>6</b>
Balachandar Jessy Esther Rani	Hirthick naveen	21952878	<b>7</b>
Bana	Preet	21303421	<b>8</b>
Barua	Nirvik	21384730	<b>9</b>
Barua	Tonmoy	21927850	<b>10</b>
Basnet	Dipesh	22005744	<b>11</b>
Bhandari	Sastika	21642153	<b>12</b>
Bhandari	Ujjwol	21979440	<b>13</b>
Bhusal	Madan	21594869	<b>14</b>
Bidha	Phub	21704600	<b>15</b>
Chakubaji	Rubal	21891667	<b>16</b>
Chandra Sekaran	Varun Kumar	21277474	<b>17</b>
Cheng	Chen	21771811	<b>18</b>
Chhetri	Dinesh	21675612	<b>19</b>
Choden	Pema	21963294	<b>20</b>
Dagar	Naveen Kumar	21716595	<b>21</b>
Dassanayake	Thasara Samod	21667949	<b>22</b>
Davaasambuu	Hishko	21312595	<b>23</b>
Deki	Sonam	21768800	<b>24</b>
Dema	Dechen	21991622	<b>25</b>
Dema	Kinley	21736276	<b>26</b>
Dema	Sangay	21532636	<b>27</b>
Dembereldodov	Odno	21434680	<b>28</b>
Dendup	Sonam	21654527	<b>29</b>
Dhar	Jyotirmoy	21405204	<b>30</b>
Ding	Luyao	21717022	<b>31</b>
Dinglasan	Lojilyn	21347830	<b>32</b>
Dorji	Dechen	21762763	<b>33</b>
Dorji	Jampel	21829309	<b>34</b>
Dorji	Lobzang	21652783	<b>35</b>
Dorji	Rinchen	21673726	<b>36</b>
Dorji	Rinzin	21630941	<b>37</b>
Dorji	Tashi	21770164	<b>38</b>
Doya	Passang	21545184	<b>39</b>
Du	Ruishi	21950034	<b>40</b>
Duldulao	Kathleen Faith	21461798	<b>41</b>

Erdenebat	Zola	21791660	<b>42</b>
Estupinan Chaw	Guillermo	21451375	<b>43</b>
Galicia	Joshua Benjamin	21418477	<b>44</b>
Ghalley	Denesh	21969438	<b>45</b>
Gill	Jugraj Singh	21247147	<b>46</b>
Giri	Anish	22018098	<b>47</b>
Golgoon	Delaram	22184012	<b>48</b>
Golushkova	Larisa	21216024	<b>49</b>
Granado	Jesshell	21809592	<b>50</b>
Gurung	Parmila	21587966	<b>51</b>
Gyeltshen	Kencho	22053086	<b>52</b>
Gyeltshen	Thinley	21667198	<b>53</b>
Haque	Onisha	22256746	<b>54</b>
Hasan	S M Minhazul	21949663	<b>55</b>
Hassan	Ibrahim Ali Ibrahim Ali	21906480	<b>56</b>
Hirani	Jinesh	20928797	<b>57</b>
Jadhav	Bhargav Manoj	21864436	<b>58</b>
Jahir	Foige Mohammed	21360879	<b>59</b>
Jayawardana Arachchige	Sanjeewa Sampath Jayawardana	21116603	<b>60</b>
Jha	Chandani	21407996	<b>61</b>
Joy	Alfine	21908839	<b>62</b>
Justin	Abil	21644256	<b>63</b>
K C	Sujata	21758924	<b>64</b>
Kafle	Avash	21436327	<b>65</b>
Kafle	Dinesh	22051598	<b>66</b>
Karki	Purushottam	21840575	<b>67</b>
Kathiravan	Bhaarith	20928962	<b>68</b>
Kathiriya	Yash	21839188	<b>69</b>
Kaung Htet Naing	Kaung Htet Naing	21206766	<b>70</b>
Khadka	Amrit	21758940	<b>71</b>
Khadka	Sailesh	21721489	<b>72</b>
Khadka	Ujjal	21785171	<b>73</b>
Khan	Koural	21556173	<b>74</b>
Khatiwada	Yogesh	21395020	<b>75</b>
Kheni	Jemish Hiteshbhai	21733992	<b>76</b>
Komalan	Sambhu	21428984	<b>77</b>
Kuria	Elsa Wanjiru	21976027	<b>78</b>
Lhamo	Chimi	21658367	<b>79</b>
Liu	Sam	21817922	<b>80</b>
Liu	Sitong	22000875	<b>81</b>
Maerz Laurent	Juan Nicolas	21522721	<b>82</b>
Maharjan	Shailendra	21757167	<b>83</b>
Mansuri	Sabi	21880063	<b>84</b>
Mathew	Kevin	21868823	<b>85</b>
Mayad	Inshad Ul	21962822	<b>86</b>

Mehta	Sarvang Jayeshkumar	21893469	<b>87</b>
Neelam	Rohith	21895193	<b>88</b>
Ng	Gerald Zhan Bo	18770993	<b>89</b>
Niroula	Pradip	21674091	<b>90</b>
Norbu	Tenzin Choki	21915033	<b>91</b>
Norbu	Tshewang	21604603	<b>92</b>
Panthee	Kapil	21861233	<b>93</b>
Patel	Manishkumar Kanubhai	21957501	<b>94</b>
Phuntsho	Royal	21420605	<b>95</b>
Poovaliparambil Shahulhameed	Salih	21759367	<b>96</b>
Potluri	Bhavana	21988213	<b>97</b>
Rai	Heman	21741021	<b>98</b>
Rai	Subash	21661365	<b>99</b>
Rajeev	Rachita	21690644	<b>100</b>
Ranjitkar	Upama	21677689	<b>101</b>
Raval	Bhumin Vipulkumar	21834594	<b>102</b>
Regis	Reyland	21720062	<b>103</b>
Ren	Zhaoyang	21673865	<b>104</b>
Rifat	S M Abul Fatha	21446012	<b>105</b>
Sah	Dharmendra	21651007	<b>106</b>
Saju	Eldho	21568327	<b>107</b>
Samdrup	Tashi	21918595	<b>108</b>
Sane	Nihar	21667499	<b>109</b>
Selden	Pema	21724394	<b>110</b>
Shah	Darsh	21325467	<b>111</b>
Shah	Pankaj	21590236	<b>112</b>
Shahi	Sushmita	21710872	<b>113</b>
Shaji	Anjusha	21435256	<b>114</b>
Sharma	Siddhant	20667061	<b>115</b>
Singh Dangol	Bijan	21728312	<b>116</b>
Tamang	Nim Dorji	21840261	<b>117</b>
Tao	Mike	21916463	<b>118</b>
Tashi	Tshering	21658529	<b>119</b>
Tenzin	Jurme	21587209	<b>120</b>
Thapa	Sarad	21978696	<b>121</b>
Thapa	Viki	21534441	<b>122</b>
Thelwadana Mudiyansele	Kaveesha Chiraptha Bandara Wijeratne	21684948	<b>123</b>
Toyoshima Hirata	Marcelo	21383986	<b>124</b>
Tshering	Pemba	21603781	<b>125</b>
Vikas	Vikas	21867105	<b>126</b>
Wainaina	Samuel	21660621	<b>127</b>
Wang	Shuoyan	21893207	<b>128</b>
Wangchuk	Sonam	21405097	<b>129</b>

Wangchuk	Ugyen	21621262	<b>130</b>
Wangda	Dorji	21627231	<b>131</b>
Wangdi	Kezang	21645152	<b>132</b>
Wangdi	Sangay	22051996	<b>133</b>
Xiao	Huiqiong	21905694	<b>134</b>
Yangzom	Sonam	21658477	<b>135</b>
Yao	Yao	21991567	<b>136</b>
Yoesel	Jigthril	21668641	<b>137</b>
Yoezer	Jigyel	21639210	<b>138</b>
Younten	Kuenzang	22021229	<b>139</b>
Youzer	Pema	21330678	<b>140</b>
Yu	Zhenxiao	22013349	<b>141</b>
Zhang	Dingren	21989892	<b>142</b>