

0171-518 Level 3 Land-Based Engineering - Theory exam (2)-March 2018

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

Q	Acceptable answer(s)	Guidance	Max mks
1	a) 1 mark for stating hypoid bevel gear. b) 1 mark for each of the following up to 4 marks: <ul style="list-style-type: none"> • Allows non-intersecting, non-parallel shafts to mesh. • Operates more quietly than spiral and standard bevel gears. • Can be used for higher reduction ratios than spiral bevel gears. • Stronger than spiral and standard bevel gears. • Allows the centre of gravity of the vehicle to be lowered, increasing stability 	b) Accept any other suitable answer	5
2	1 mark for each of the following up to 5 marks: <ul style="list-style-type: none"> • Run smoother than spurs (1) (due to continuous tooth mating). (1) • Run more quietly than spurs (1) (due to continuous tooth mating). • Have a higher load capacity (1) (teeth have a greater contact area). (1) 	Accept any other suitable answer	5
3	a) 1 mark for stating taper roller bearing b) 2 marks for explanations of any of the following <ul style="list-style-type: none"> • Measuring the end-float using a Dial Test Indicator (DTI) (1) and then adjust using shim as per manufacturers specification's. (1) • Measure pre load using a pre load gauge (1) and adjust using threaded nut. (1) 	b) Accept any other suitable answer	3

4	<p>1 mark for each of the following up to 2 marks:</p> <ul style="list-style-type: none"> • A – Root • C – Pitch 		2
5	<p>$60 / 40 = 1.5$ - 1 mark</p> <p>$80 / 20 = 4$ - 1 mark</p> <p>$4/1.5 = 2.6$ -1 mark</p> <p>Overall ratio = 2.6: 1 - 1 mark</p>		4
6	<p>a) 1 mark for stating multi-plate wet clutch.</p> <p>b) 1 mark for each of the following up to 3 marks: C – Counter plates D – Friction discs E – Annular piston</p>	<p>a) Accept multi-plate clutch. b) C - Accept intermediate plates</p>	4
7	<p>1 mark for each of the following up to 2 marks:</p> <ul style="list-style-type: none"> • To allow the smooth engagement of gears. • Matching the speeds of the engaging couplings. 	Accept any other suitable answer	2
8	<p>a) 1 mark for mentioning each of the following up to 2 marks:</p> <ul style="list-style-type: none"> • Through Electro hydraulic control using a binocular valve (1) that is solenoid activated. (1) • Through direct mechanical linkage (1) from the gear lever using selectors and selector rails (1) <p>b) 1 mark for any of the following</p> <ul style="list-style-type: none"> • Worn/damaged detent on the selector rail. • Worn/damaged detents in the synchroniser. 	Accept any other suitable answers	5

<p>9</p>	<p>2 marks for each of the following, up to 6 marks</p> <ul style="list-style-type: none"> • Worn friction discs within the clutch pack (1) causing low friction during engagement (1) • Damaged/worn hydraulic seals with in the clutch pack (1) causing increased leak off and reducing pressure during engagement (1) • pump/system fault (1) causing low hydraulic oil pressure to the supply of the clutch pack (1) 	<p>Accept any other suitable answer</p>	<p>6</p>
<p>10</p>	<p>a) 1 mark for stating hydrostatic transmission.</p> <p>b) 1 mark for each of the following up to 3 marks:</p> <ul style="list-style-type: none"> • A = Charge pump. • C = Motor loop flush/low side hot oil shuttle valve. • D = Bi-directional drive motor. <p>c) 2 marks for each of the following up to 8 marks:</p> <ul style="list-style-type: none"> • Worn wheel motors (1) causing excessive leak off through the motor (1) • Incorrectly adjusted pressure relief valve (1) causing low pressure in the motor circuit (1) • Low hydraulic oil level (1) causing low oil pressure in the motor circuit (1) • Incorrect oil viscosity too thin (1) causing reduced pressure and higher leak off (1) • Worn hydraulic pump (1) causing reduced flow rate (1) • Partially blocked charge filter (1) causing restricted oil flow into the circuit (1) 	<p>b) A – Accept fixed displacement pump or uni-directional pump</p> <p>c)- Accept any other suitable answer</p>	<p>12</p>
<p>11</p>	<p>Band 1 (1-4 marks) The candidate has failed to propose many of the appropriate preparation, resources and steps required. The candidate has provided minimal rationale as to why they have proposed any preparation, resources and steps required. The candidate’s response may have frequently strayed from focusing on the relevant transmission system and components. The candidate will not have suggested any expected outcomes of their proposed diagnostic steps.</p> <p>Band 2 (5-8 marks) The candidate has proposed some appropriate preparation, resources and steps required, in a mostly workable sequence. The candidate has occasionally</p>	<p>Indicative content</p> <ul style="list-style-type: none"> • Discuss symptoms of the fault with the operator • Operate the tractor to verify the fault • Check diagnostic tool for correct software • Check for error codes • Check hydraulic oil level • Calibrate transmission • Select and check technical data/information • Conduct hydraulic pressure and flow test 	<p>12</p>

	<p>provided reasons why they have proposed the preparation, resources and steps required. The candidate has largely focused on the relevant transmission systems and components, but may have strayed into discussing irrelevant components. The candidate is unlikely to have suggested expected outcomes of their proposed diagnostic steps.</p> <p>Band 3 (9-12 marks)</p> <p>The candidate has proposed a broad range of appropriate preparation, resources and steps required, and in a logical sequence. The candidate has provided clear reasons why they have proposed the preparation, resources and steps required. The candidate has remained focused on the relevant transmission systems and components. The candidate has (where applicable) suggested expected outcomes of their proposed diagnostic steps.</p>	<ul style="list-style-type: none"> • Check electrical solenoids for correct operation • Check clutch engagement chart against slipping gears during operation • Conduct hydraulic pressure test on individual clutch pack • Check pressure and flow testing equipment for correct calibration 	
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